Columbia University Bulletin

College of Pharmaceutical Sciences

1972-1973

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To Communicate with the College

ADDRESS INQUIRIES TO: Office of Admissions, College of Pharmaceutical Sciences, 115 West 68th Street, New York, N. Y. 10023. Office hours: Monday through Friday, 9 a.m. to 5 p.m.

TELEPHONE: (Area code 212) 787–0600

Accreditation

The College of Pharmaceutical Sciences is a member of the American Association of Colleges of Pharmacy and is accredited by the American Council on Pharmaceutical Education and by the Middle States Association of Colleges and Universities.

The College of Pharmaceutical Sciences reserves the right to make changes at any time in the curriculum, schedule, calendar, and regulations printed in this bulletin.

All photographs by Stan Katz

College of Pharmaceutical Sciences

1972-1973

Columbia University in the City of New York

Academic Calendar, 1972-1973

Note that Columbus Day, Veterans Day, Lincoln's Birthday, and Washington's Birthday are not University holidays.

For additional dates special to the Ph.D. program, see the bulletin of the Graduate School of Arts and Sciences.

AUTUMN TERM

Sept	**4**	Monday. Labor Day. Holiday.
	5	Tuesday. Graduate student orientation program. Teaching assistants' orientation program.
	6	Wednesday. Placement examination for new graduate students. Registration for returning graduate students in the departments of Pharmaceutics, Biological Sciences and Pharmacology, and Chemistry.
	7	Thursday. Placement examination for new graduate students. Registration for returning graduate students in administrative pharmacy and the Pharm.D. program.
	8	Friday. Registration for second-year undergraduate students with irregular programs. Registration for all new graduate students.
	11	Monday. Registration for third-year undergraduate students with irregular programs.
	12	Tuesday. Registration for fourth-year undergraduate students with irregular programs. Teaching assistants' duties begin.
	13	Wednesday. Registration for fifth-year undergraduate students with irregular programs.
	13–15	Wednesday–Friday.* Freshman and new student orientation program.
	14–15	Thursday–Friday.† Registration for upperclassmen with regular programs.
	15–22	Friday–Friday. Late registration.
	18	Monday. Classes begin for graduate and undergraduate students at the College of Pharmaceutical Sciences.
	19–20	Tuesday–Wednesday, and 27–29, Wednesday–Friday. Registration for Ph.D. degree students and courses taken in the Graduate School of Arts and Sciences.

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*All new first-year undergraduates register during the orientation program.

†Students allowed to register after the period specified must pay a late fee and must show satisfactory cause for the delay.

Sept 19–23	Tuesday–Saturday. Orientation program for new foreign students (see page 51).
26	Tuesday. Last day to change programs.
28	Thursday. Morningside campus classes begin. Last day to file *late* applications for October degrees.*
Oct 25	Wednesday. Award of October degrees.
Nov 3	Friday. Midterm date.
7	Tuesday. Election day. Holiday.
23–26	**Thursday–Sunday. Thanksgiving holidays.**
29	Wednesday.† Last day to apply for February degrees (see January 25).
Dec 1	Friday. Last day to drop courses without penalty.
21	**Thursday, through January 3, 1973, Wednesday. Christmas holidays.**
Jan 10	Wednesday. Last day of classes, autumn term.
15–19	Monday–Friday. Midyear course examinations. Term ends.

SPRING TERM

Jan 24	Wednesday. Registration in the M.S. and Pharm.D. degree programs.
25	Thursday. Last day to file *late* applications for February degrees.
25–26	Thursday–Friday.‡ Registration in the B.S. degree programs.
29	Monday. Term begins for all degree candidates. Last day to file essays for the M.S. degree to be awarded in February.
Feb 7	Wednesday. Morningside campus classes begin.
9	Friday. Last day for change of programs.
21	Wednesday. Award of February degrees.
28	Wednesday.† Last day to apply for June degrees (see April 30).
Mar 16	Friday. Midterm date.
25	**Sunday, through April 1, Sunday. Spring holidays.**
Apr 6	Friday. Last day to drop courses without penalty.
30	Monday. Last day to file *late* applications for June degrees.
May 11	Friday. Last day to file essays for the M.S. degree to be awarded in June. Last day of classes, spring term.
16–24	Wednesday–Thursday. Final examinations in the B.S. programs. Term ends.

COMMENCEMENT

June 3	Sunday. Baccalaureate Service.
5	**Tuesday. Conferring of degrees.**

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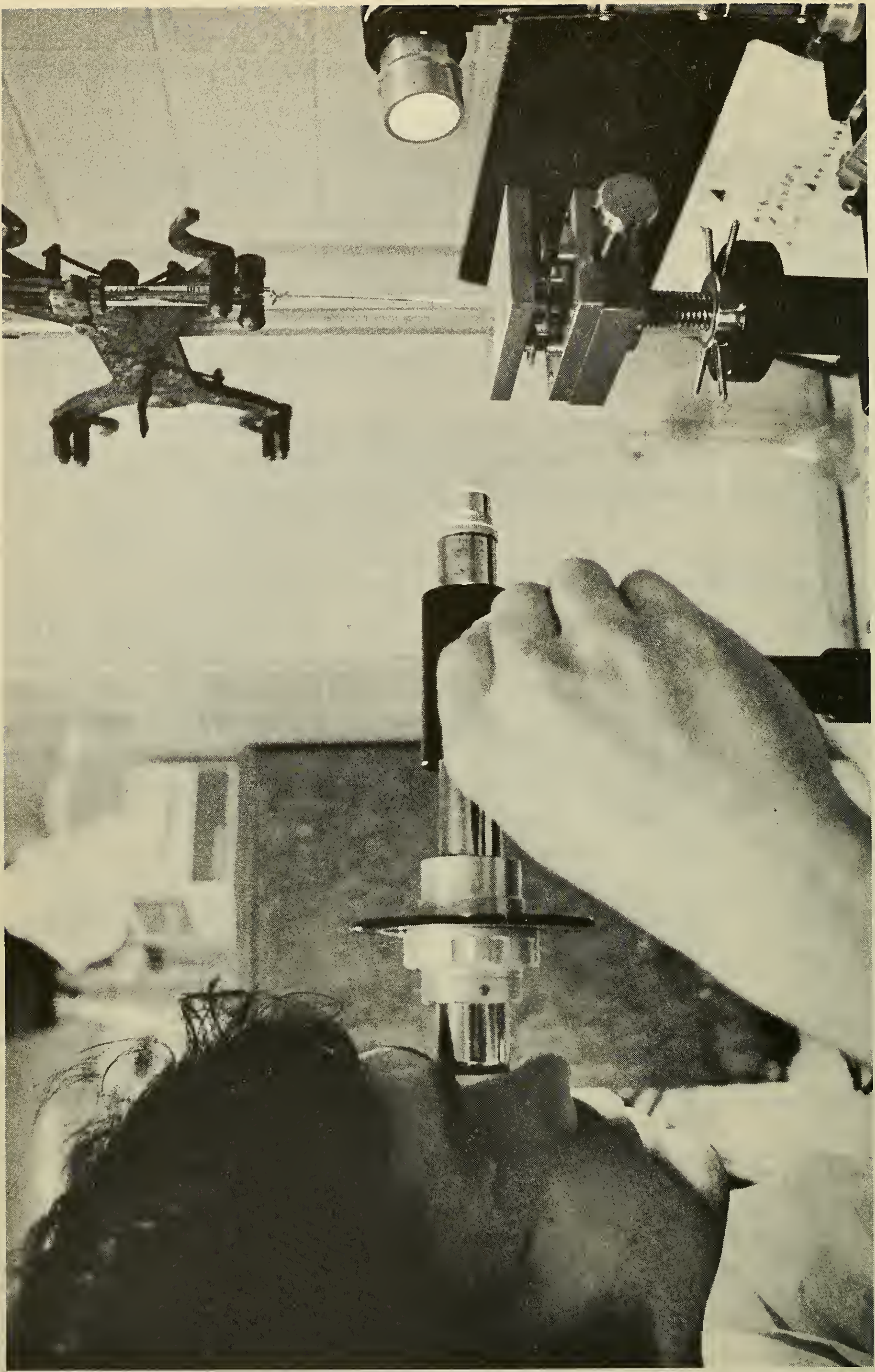
*August 1, last day to file applications for October degrees.

†Students who apply after this date must pay a late fee.

‡Students allowed to register after the period specified must pay a late fee and must show satisfactory cause for the delay.



College of Pharmaceutical Sciences

The College of Pharmaceutical Sciences, Columbia University, established in 1829, is the second oldest institution of its kind in the Western Hemisphere. Throughout its long history the College has maintained a position of leadership both in the pharmaceutical profession and in pharmaceutical education.

In 1851 the College initiated a series of meetings which led to the formation of the American Pharmaceutical Association, the professional organization that represents pharmacy on the national level. At the turn of the century, the College of Pharmaceutical Sciences was instrumental in establishing the first laws pertaining to standards of purity for drugs. As a result of its affiliation with Columbia University in 1904, the College became one of the first in the country to offer a university degree in the study of pharmacy.

Today the College of Pharmaceutical Sciences is known for its progressive educational programs that reflect the changing patterns of health care in the United States. The only college of pharmacy in the country to offer parallel undergraduate programs in health sciences and pharmaceutical sciences, the College of Pharmaceutical Sciences provides its students with unlimited opportunities to enjoy a variety of professional options upon graduation. Graduates of the College are to be found in community and hospital pharmacy practice; medicine and dentistry; pharmaceutical research, production, marketing, and advertising; governmental and private health agencies; teaching; pharmaceutical law; and an infinite number of science and health related fields.

The undergraduate programs in pharmacy and health sciences leading to the Bachelor of Science degree, conferred by Columbia University, provide students with an appropriate balance of liberal arts, humanities, basic sciences, and professional courses. Electives stimulate the development of individual interests and talents in preparation for satisfying careers.

The College encourages research on the undergraduate level and provides students with the opportunity to work closely with faculty members on significant research projects.

In addition, the College offers graduate programs in pharmaceutical sciences which lead to the Master of Science and Doctor of Philosophy degrees. In September 1969 the College became one of several in the country to offer the Doctor of Pharmacy degree for advanced professional study in clinical pharmacy.

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The Faculty of Pharmaceutical Sciences

Joseph L. Kanig, Ph.D. *Dean of the College of Pharmaceutical Sciences*

Lynne Belaief. *Assistant Professor of Philosophy*
B.A., Vassar, 1958; Ph.D., Columbia, 1963

John J. Casazza, Jr. *Assistant Professor of Chemistry*
B.S., Scranton, 1952; M.S., Holy Cross, 1955; Ph.D., Fordham, 1965

Benjamin P. Dailey. *Professor of Chemistry*
B.A., Southwest Texas State, 1938; M.A., Texas, 1940; Ph.D.. 1942

Max A. Eisenberg. *Professor of Biochemistry*
B.A., Brooklyn, 1938; M.S., New York University, 1941; Ph.D., Duke, 1950

Suzanne A. Galton. *Associate Professor of Chemistry*
B.S., Hunter, 1953; M.S., Polytechnic Institute of Brooklyn, 1960; Ph.D., 1963

Allan R. Gluck. *Assistant Professor of Community Health and Administration*
B.S., Fordham, 1952; M.S., Columbia, 1968

Arthur H. Goldberg. *Assistant Professor of Pharmaceutics*
B.S., Columbia, 1956; M.S., 1965; Ph.D., Michigan, 1968

Ikram Hassan. *Associate Professor of Pharmacognosy and Microbiology*
B.S., Panjab (India), 1941; M.S., Aligarh Muslim, 1943; D.Sc., Philadelphia College of Pharmacy and Science, 1958

Gilbert J. Hite. *Professor of Chemistry*
B.S., New England College of Pharmacy, 1954; M.S., Wisconsin, 1957; Ph.D., 1959

Brian F. Hoffman. *Professor of Pharmacology*
B.A., Princeton, 1946; M.D., Long Island College of Medicine, 1949

Bernard Idson. *Adjunct Assistant Professor of Applied Pharmaceutical Sciences*
B.S., Brooklyn, 1939; M.S., Polytechnic Institute, 1944; Ph.D., 1951

Louis Neal Irwin. *Assistant Professor of Biology*
B.A., Texas Technological, 1965; Ph.D., Kansas, 1969

Joseph L. Kanig. *Professor of Pharmaceutics*
B.S., Long Island, 1942; M.S., Columbia, 1949; Ph.D., New York University, 1960

Philip Keusch. *Adjunct Assistant Professor of Community Health and Administration*
B.S., Columbia, 1950; M.S., Brooklyn, 1962

Kurt Kleinmann. *Adjunct Assistant Professor of Institutional Pharmaceutics*
B.S., Rhode Island, 1952; M.S., St. Louis, 1959

Winthrop E. Lange. *Adjunct Assistant Professor of Applied Pharmaceutical Sciences*
M.A., Wisconsin, 1953; Ph.D., 1955

Martin Levin. *Adjunct Assistant Professor of English*
B.A., Columbia, 1940; M.A., 1949

Frank G. Lier. *Professor of Biological Sciences*
B.A., Columbia, 1935; M.A., 1937; Ph.D., 1950

Matthew Lipman. *Professor of Philosophy*
B.S., Columbia, 1948; Ph.D., 1950

Gerald M. Lucas. *Adjunct Assistant Professor of Philosophy*
B.S., College of the City of New York, 1948; M.A., Columbia, 1951; Ph.D., 1956

Philip H. Mann. *Adjunct Assistant Professor of Biology*
B.S., Connecticut, 1946; D.V.M., Sassari (Italy), 1968

Carl H. Marazzi. *Assistant Professor of Community Health and Administration*
B.A., Columbia, 1958; B.S., Fordham, 1962; M.S., Long Island, 1964

Eric C. Martin. *Adjunct Professor of Biomedical Communications*
B.S., Philadelphia College of Pharmacy and Science, 1942; M.S., Pennsylvania, 1948; Ph.D., 1949

Bernard Mehl. *Adjunct Assistant Professor of Institutional Pharmaceutics*
B.S., Fordham, 1955; M.B.A., Fairleigh Dickinson, 1967

Philip C. Merker. *Professor of Pharmacology*
B.A., Brooklyn, 1946; B.S., Long Island, 1951; M.S., Purdue, 1953; Ph.D., 1954

Dhun Patel. *Assistant Professor of Chemistry*
B.S., Bombay, 1960; Ph.D., Iowa, 1966

Morton Rosoff. *Associate Professor of Pharmaceutics*
B.A., Brooklyn, 1942; M.S., 1949; Ph.D., Duke, 1954

Gilbert I. Simon. *Adjunct Assistant Professor of Institutional Pharmaceutics*
B.S., Fordham, 1956; M.S., Long Island, 1967

Margaret C. Staud. *Associate Professor of Biology*
B.A., Columbia, 1940; M.A., Cornell, 1941; Ph.D., Columbia, 1967

P. Christian Vogel. *Assistant Professor of Chemistry*
B.A., B.S., Lawrence, 1963; Ph.D., Indiana

Norman D. Weiner. *Associate Professor of Pharmaceutics*
B.S., Long Island, 1959; Ph.D., Columbia, 1965

► OTHER OFFICERS OF INSTRUCTION

INSTRUCTORS

Peter Barland, M.D.
(Clinical Pharmaceutics)

Zena Fediay, M.S.
(Institutional Pharmaceutics)

Robert Feinberg, B.S.
(Institutional Pharmaceutics)

Leslie S. Libow, M.D.
(Clinical Pharmaceutics)

Robert J. Menegaz, M.D.
(Clinical Pharmaceutics)

Harold Satz, M.D.
(Clinical Pharmaceutics)

Harold Silverman, Pharm.D.
(Institutional Pharmaceutics)

LECTURERS

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(Applied Science)

Louis Burris, M.A.
(Applied Science)

Harold N. Chefitz, M.B.A.
(Community Health and Administration)

David C. Dimendberg, M.S.
(Community Health and Administration)

Theodore Feder, M.A.
(General Education)

Irwin Gerson, M.B.A.
(Community Health and Administration)

Thomas Grenfell, M.S.
(Applied Science)

George Karatzas, M.A.
(Community Health and Administration)

Herbert Kazdin, B.S.
(Pharmaceutics)

John F. Kuemmerle, M.B.A.
(Applied Science)

Irving Ladimer, S.J.D.
(Community Health and Administration)

Erwin Lutwak, B.S.
(Mathematics)

John Pfeiffer, M.B.A.
(Community Health and Administration)

David Popofsky, M.S.
(Community Health and Administration)

Ira L. Sharenow, LL.B.
(Community Health and Administration)

John Clifton Thoms, M.A.
(General Education)

Joel Wittenberg, B.S.
(Community Health and Administration)

CHAIRMEN OF DEPARTMENTS OF INSTRUCTION

Suzanne A. Galton. *Chemistry*

Allan R. Gluck. *Community Health and Administration*

Matthew Lipman. *General Education*

Philip C. Merker. *Biological Sciences and Pharmacology*

Norman D. Weiner. *Pharmaceutics*

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Stephen M. Gross, M.A. *Associate Dean and Director of Extension Services*

T. Alan Kotas, M.A. *Director of Admissions*

Louise M. Taylor, M.A. *Director of Student Affairs*

Agnes Tiborcz, L.S. *Librarian*

OFFICERS EMERITI

Lewis N. Brown, Phar.D. *Professor Emeritus of Pharmacy*
Sag Harbor, New York

Fanchon Hart, M.A. *Professor Emeritus of Biology*
Yorktown Heights, New York

Samuel S. Liberman, M.A. *Professor Emeritus of Chemistry*
Brooklyn, New York

Frank J. Pokorny, M.A. *Professor Emeritus of Biology*
Brooklyn, New York

Abraham Taub, M.A. *Distinguished Service Professor Emeritus of Pharmaceutical Chemistry*
New York, New York

The Bachelor of Science Programs

The College of Pharmaceutical Sciences offers two undergraduate programs: a five-year program leading to the degree of Bachelor of Science in pharmaceutical sciences and a four-year program leading to the degree of Bachelor of Science in health sciences. In both programs the degree is conferred by Columbia University.

► PROGRAM IN PHARMACEUTICAL SCIENCES

This program encourages students to explore the many career opportunities in the pharmaceutical sciences. Elective courses offered in the areas of community pharmacy, hospital pharmacy, and industrial pharmacy (research and management) provide opportunity for specialization according to the student's individual interests. Students may also utilize elective courses in other areas in preparation for advanced study. The program in pharmaceutical sciences fulfills the requirements for admission to the state licensing examinations throughout the country.

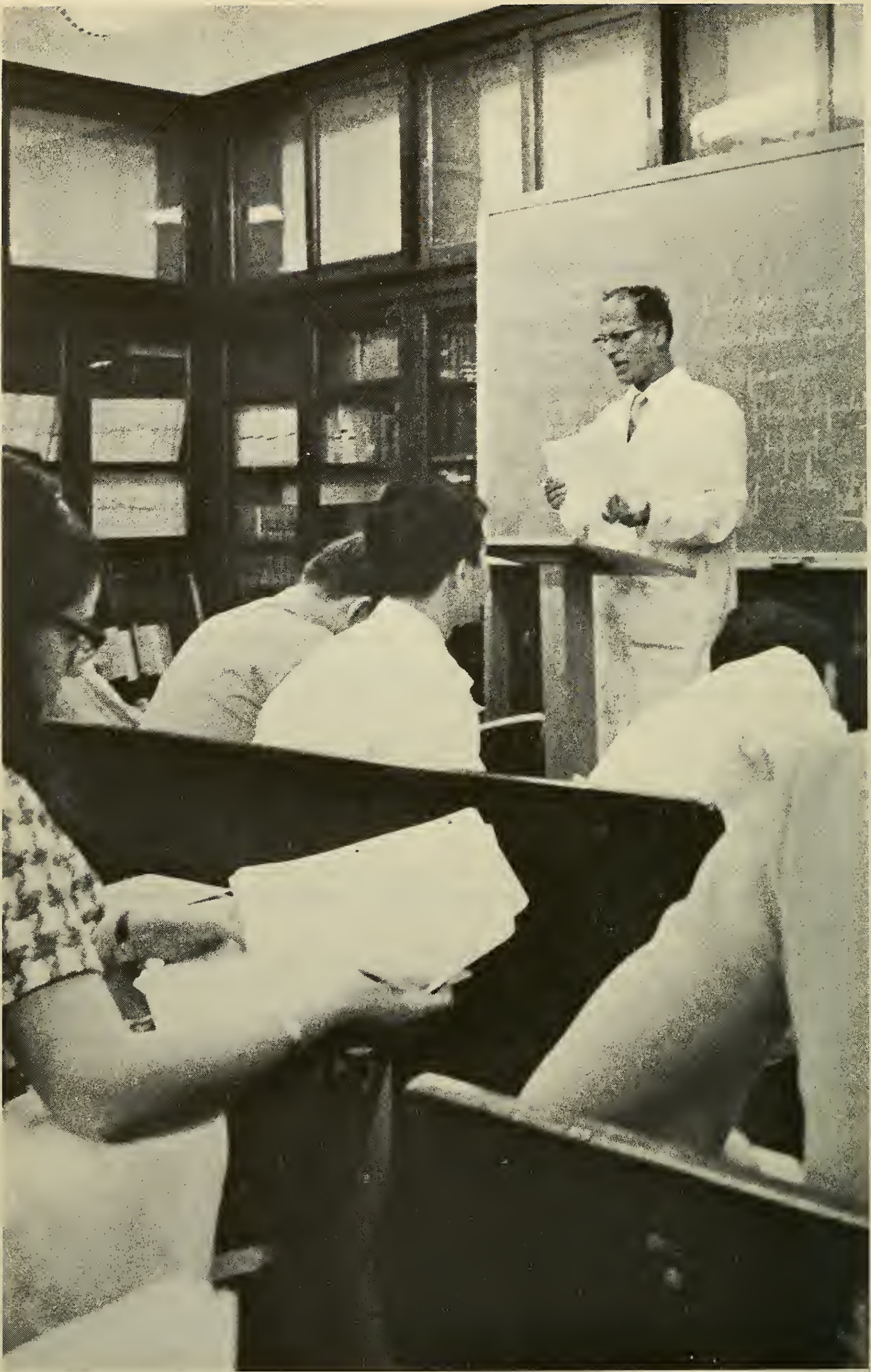
► PROGRAM IN HEALTH SCIENCES

This program has been created for the student who intends to pursue more advanced studies in the health sciences upon completion of the baccalaureate program.

Emphasis is on comprehensive preparation in the basic sciences and in selected courses that are usually found only in graduate or professional programs, e.g., pharmacology, medicinal chemistry, biopharmaceutics. Students are encouraged to engage in independent study and research, and should possess strong science interests and aptitudes.

► ADMISSION REQUIREMENTS AND PROCEDURE

All qualified men and women receive consideration for admission without regard to race, creed, color, sex, or national origin. An applicant must be in good health and must show evidence of good character. His secondary-school record must include at least 16 units of work completed in an approved four-year high school or the equivalent, thereby satisfying the requirements of the New York State Education Department. Although no specific program of secondary education is required, the following preparation is recommended:



	Units
English literature and composition	4
American history and social studies	2
Ninth-year mathematics or elementary algebra	1
Tenth-year mathematics or plane geometry	1
Eleventh-year mathematics or intermediate algebra	½–1
Foreign language (one)	2
Chemistry	1
Academic electives	4–4½
	15½–16½

It is desirable for the applicant to include, as electives, additional courses in science (biology, physics) and in mathematics (trigonometry, advanced algebra).

A candidate whose preparation differs from that suggested above should consult the Director of Admissions of the College of Pharmaceutical Sciences for advice regarding his eligibility for admission.

ADMISSION PROCEDURE

Requests for information and for application forms should be addressed to the Director of Admissions, College of Pharmaceutical Sciences, Columbia University, 115 West 68th Street, New York, N.Y. 10023. The completed application, including the information to be supplied by the secondary school, may be submitted after the completion of six terms of secondary school studies.

All candidates are required to participate in the morning Scholastic Aptitude Test, which is administered by the College Entrance Examination Board. For information about this test and for the application form, the candidate should write to the College Entrance Examination Board, Box 592, Princeton, N.J. 08540. The identification number assigned to the College of Pharmaceutical Sciences is 2103.

Each candidate must also file a medical and physical examination form completed by his personal physician.

A fee of $20 must accompany the application. Checks should be made payable to the College of Pharmaceutical Sciences.

An applicant who is accepted for admission must pay a commitment fee of $50. This fee is credited toward tuition if the applicant registers for the term to which he has been admitted; it is not refundable if the applicant withdraws.

Applicants are cordially invited to visit the College of Pharmaceutical Sciences for a conference with the Director of Admissions. Appointments may be made in advance by letter or by telephoning (area code 212) 787–0600.

ADVANCED PLACEMENT

Qualified students may be granted college credit for course work completed under the auspices of the Advanced Placement Program.

For advanced placement and credit in any subject, an entering student must have demonstrated proficiency in a college-level course completed in secondary school and in the Advanced Placement Examination administered by the College Entrance Examination Board.

Course credit may also be granted if an entering student has completed, with an acceptable score, a New York State College Proficiency Examination in a subject corresponding to a course in the curriculum of the College. When the course in question involves laboratory work, the student may be required to complete, with an acceptable grade, a laboratory examination administered by the appropriate department of the College.

ADVANCED STANDING

Advanced standing may be granted to an applicant who has completed course work in an accredited college or university. Candidates for admission with advanced standing should have satisfied all requirements for admission to the Bachelor of Science program and should file a regular application form. The academic credentials to be submitted include an official transcript of secondary school studies, an official transcript of the college record, and a certificate of honorable dismissal, or one indicating that the candidate is entitled to honorable dismissal, from each college attended. Each document must be sent directly from the Registrar's Office of the school which the candidate has attended to the Director of Admissions of the College of Pharmaceutical Sciences, Columbia University. A marked catalogue showing courses completed in the college or university must be submitted for purposes of evaluation. No credit may be given for any course in which a grade lower than C (or its equivalent) has been earned.

Students receive advanced standing only if the courses they have taken are equivalent to the courses required at the College. Candidates may be given elective credit for courses in any academic area, even those not offered by the College (e.g., foreign languages). In the case of basic language courses, candidates must have completed at least a one-year sequence with grades of C or better.

Special requirements for students transferring from other colleges of pharmacy: In addition to fulfilling the regular requirements for all students entering the College from another school, candidates who have attended a college of pharmacy *must* include a letter of recommendation from the dean of the college of pharmacy they are leaving. This requirement was established by the American Council on Pharmaceutical Education, and cannot be waived for any student.

ADMISSION BASED ON FOREIGN STUDY

Foreign students are eligible for admission to the College if they have had twelve or more years of combined elementary (primary) and secondary education. This preparation must include at least ten courses at the secondary level in academic subjects, at least two of which must be in mathematics. (See Admission Requirements and Procedures.) Foreign students must submit the following credentials:

1. Certified true copies of all academic credentials (mark sheets, diplomas, degrees, licenses, leaving certificates, etc.).

2. Certified translations of any credentials not in English.
3. Application for Appraisal of Foreign Credentials.
4. Scores of the Test of English as a Foreign Language (see page 31).
5. Certificate of Proficiency in English.
6. Application and Health Form.

Students wishing advanced standing for courses completed in a college outside the United States must also submit official course outlines, syllabi and/or catalogues, book lists, and an explanation of the grading system(s) used.

These materials should be sent to the Director of Admissions, College of Pharmaceutical Sciences, Columbia University, 115 West 68th Street, New York, N.Y. 10023. If the mails are used, send all documents by *registered mail.*

► REQUIREMENTS FOR THE DEGREE

To be awarded the degree, the candidate must meet the following requirements:

1. He must be of good moral character.
2. He must have completed at least one academic year of full-time study at the College.
3. He must have completed all required and elective courses—or their approved equivalents—established by the Faculty as degree requirements.
4. He must have achieved a cumulative quality-point average of at least 2.00 (Pharmaceutical Sciences) or a cumulative merit rating index of 2.00 (Health Sciences). See the student handbook of the College for definition of these terms.
5. A student in Pharmaceutical Sciences must have accumulated no more than 20 credits of D. A student in Health Sciences must have accumulated no more than 15 credits of D.
6. He must have discharged all financial obligations to the College.

► THE CURRICULUM: PROGRAM IN PHARMACEUTICAL SCIENCES

FIRST YEAR

Biological Sciences and Pharmacology 1513-1514	General biology
Chemistry 1113-1114	General chemistry
General Education 1411-1412	English
General Education 1413	Introduction to philosophy
General Education 1414	Introduction to scientific method
Mathematics 1117	Elementary functions
Mathematics 1118	Calculus, I

SECOND YEAR

Chemistry 1121-1122	Organic chemistry
Community Health and Administration 1321	Principles of economics
General Education 1421	Contemporary civilization A
General Education 1422	Behavioral sciences, I
Physics 1123-1124	General physics

THIRD YEAR

Biological Sciences and Pharmacology 1531-1532	Mammalian physiology
Chemistry 1131	Quantitative instrumental analysis
Chemistry 1132	General biochemistry
General Education 1431	Advanced composition and communication
General Education	Humanities elective (3 points)
Pharmaceutics 1233	Introduction to physical chemistry
Pharmaceutics 1234	Physical pharmacy and colloid science

FOURTH YEAR

Biological Sciences and Pharmacology 1543	Microbiology
Biological Sciences and Pharmacology 1545-1546	Pharmacology, I and II
Community Health and Administration 1342	Public health
Chemistry 1145-1146	Medicinal chemistry
General Education 1442	American government and law
Pharmaceutics 1241	Introduction to dosage forms
Pharmaceutics 1244	Biopharmaceutics
Pharmaceutics 1245	Pharmaceutical calculations

FIFTH YEAR

Community Health and Administration 5353	Pharmaceutical socioeconomics
Community Health and Administration 5356	Pharmaceutical jurisprudence
Biological Sciences and Pharmacology 5556	Clinical pharmaceutics
General Education 5451	Behavioral sciences, II
General Education 5452	Behavioral sciences, III
Pharmaceutics 5253-5254	Dispensing pharmaceutics, I and II

NOTE: In addition to the humanities elective in the third year, all students must complete 15 points in elective courses to fulfill the requirements for the B.S. degree in pharmaceutical sciences.

► THE CURRICULUM: PROGRAM IN HEALTH SCIENCES

FIRST YEAR

Biological Sciences and Pharmacology 1513-1514	General biology
Chemistry 1113-1114	General chemistry
General Education 1411-1412	English
General Education 1413	Introduction to philosophy
General Education 1414	Introduction to scientific method
Mathematics 1117	Elementary functions
Mathematics 1118	Calculus, I

SECOND YEAR

Chemistry 1121-1122	Organic chemistry
Community Health and Administration 1321	Principles of economics
General Education 1421	Contemporary civilization A
General Education 1422	Behavioral sciences, I
Mathematics 1165-1166	Calculus, II and III
Physics 1123-1124	General physics

THIRD YEAR

Biological Sciences and Pharmacology 1531-1532	Mammalian physiology
Chemistry 1131	Quantitative instrumental analysis
Chemistry 1132	General biochemistry
Chemistry 4175-4176	Physical chemistry, I and II
General Education 1431	Advanced composition and communication
General Education	Humanities elective (3 points)
Pharmaceutics 1234	Physical pharmacy and colloid science

FOURTH YEAR

Biological Sciences and Pharmacology 1543	Microbiology
Biological Sciences and Pharmacology 1545-1546	Pharmacology, I and II
Chemistry 1145-1146	Medicinal chemistry
General Education 1442	American government and law
Pharmaceutics 1244	Biopharmaceutics

NOTE: In addition to the humanities elective in the third year, all students must complete 6 points in elective courses to fulfill the requirements for the B.S. degree in health sciences.

COURSES OF INSTRUCTION

HOW COURSES ARE NUMBERED

All course numbers are preceded by the name of the department in which they are offered with the exception of mathematics and physics courses, which are listed as such, but appear in the bulletin under the Department of Chemistry.

Each course number consists of four digits. The first digit indicates the level of the course, as follows:

0	Course which cannot be credited toward any degree
1	Undergraduate course
2	Extension division course
3	Undergraduate projects or seminar course
4	Graduate course which is open to qualified undergraduates
5	Course given in the professional sequence of the B.S. degree in pharmaceutical sciences program which may also be taken in the first year of the Pharm.D. degree program
6	Graduate course
8	Advanced graduate course
9	Graduate research course or seminar

The second digit indicates the department of study in the College, as follows:

1	Chemistry
2	Pharmaceutics
3	Community Health and Administration
4	General Education
5	Biological Sciences and Pharmacology
6	Applied Science
7	Industrial Administration
8	Interdisciplinary course

For required undergraduate courses only, the third digit indicates the year in the sequence when a course is taken. For example, course 1113 is taken in the first year of the program, 1121 in the second, etc.

The term designations are as follows: *x*, autumn term; *y*, spring term.

Extension Division courses (given only in the evening) listed in this section of the bulletin may be credited as electives toward the B.S. degree programs.

Two hyphenated numbers, one odd and the other even, signify a course that runs through both terms. The first half is prerequisite to the second unless the course description indicates otherwise.

POINTS OF COURSE CREDIT

The number of points of credit a course carries *each term* is given in boldface type on the right margin of the course entry.

Courses are ordinarily taken for a basic number of points. However, additional credit may be earned upon the completion of added papers and projects.

The College reserves the right to withdraw or modify the courses of instruction or to change the instructors at any time.

APPLIED SCIENCE AND INDUSTRIAL ADMINISTRATION

The following evening courses in applied science and industrial administration may be credited as electives in the B.S. programs (see page 45).

No more than *seven points* in these subjects may be credited toward the baccalaureate.

Applied Science 2605x-2606y. Properties and applications of raw materials.

2 hours lecture. Professor Idson. **2 or 3 pts.**

Chemistry, properties, and applications of raw materials used in cosmetics. Included are water-soluble gums, resins, clays, and other dispersing agents; natural and synthetic emollients; perfumery and flavor materials; cosmetic and food colors, hair colorants; preservatives; antioxidants, and sunscreen agents.

Applied Science 2607x. Quality control. 2 or 3 pts.

2 hours lecture. Mr. Grenfell.

Good manufacturing practices; methods by which purity, uniformity, identity, and potency of drug and cosmetic materials and products are maintained. Emphasis on the function and methods of quality control from the raw materials through the finished packaged product. Included are inspection and analysis of raw material; intermediate and finishing products; packaging material and shelf-life testing; filling control and on-the-market control. Application of statistical methods to control procedures.

Applied Science 2609x-2610y. Cosmetic formulation and technology. 1 to 3 pts.

2 hours lecture, alternate weeks. 1 to 2 pts. Professor Lange.

3 hours laboratory, alternate weeks. 1 pt. Professor Lange and assistants.

The physical and functional evaluation and the principles underlying the formulation and technology of modern cosmetic products, including creams, lotions, lipsticks, rouges, eye make-up, nail products, skin tonics, antiperspirants, talcums, face powders, hair dressings and conditioners, shampoos, permanent waving products, shaving products, and aerosols.

Applied Science 2611x-2612y. Unit operations in manufacturing. 2 or 3 pts.

2 hours lecture. Mr. Brown.

The theoretical and practical aspects of fine powder technology, including particle size reduction, analysis, and blending; fluid flow and liquid agitation with relation to formulation and manufacturing processes; heat and mass transfer associated with drying operations; batch drying, spray drying, freeze drying, and fluidization technique; methods for the estimation of product stability; and a review of material balances and rate concepts.

Applied Science 2614x. Hair colorants: chemistry and technology. 2 or 3 pts.

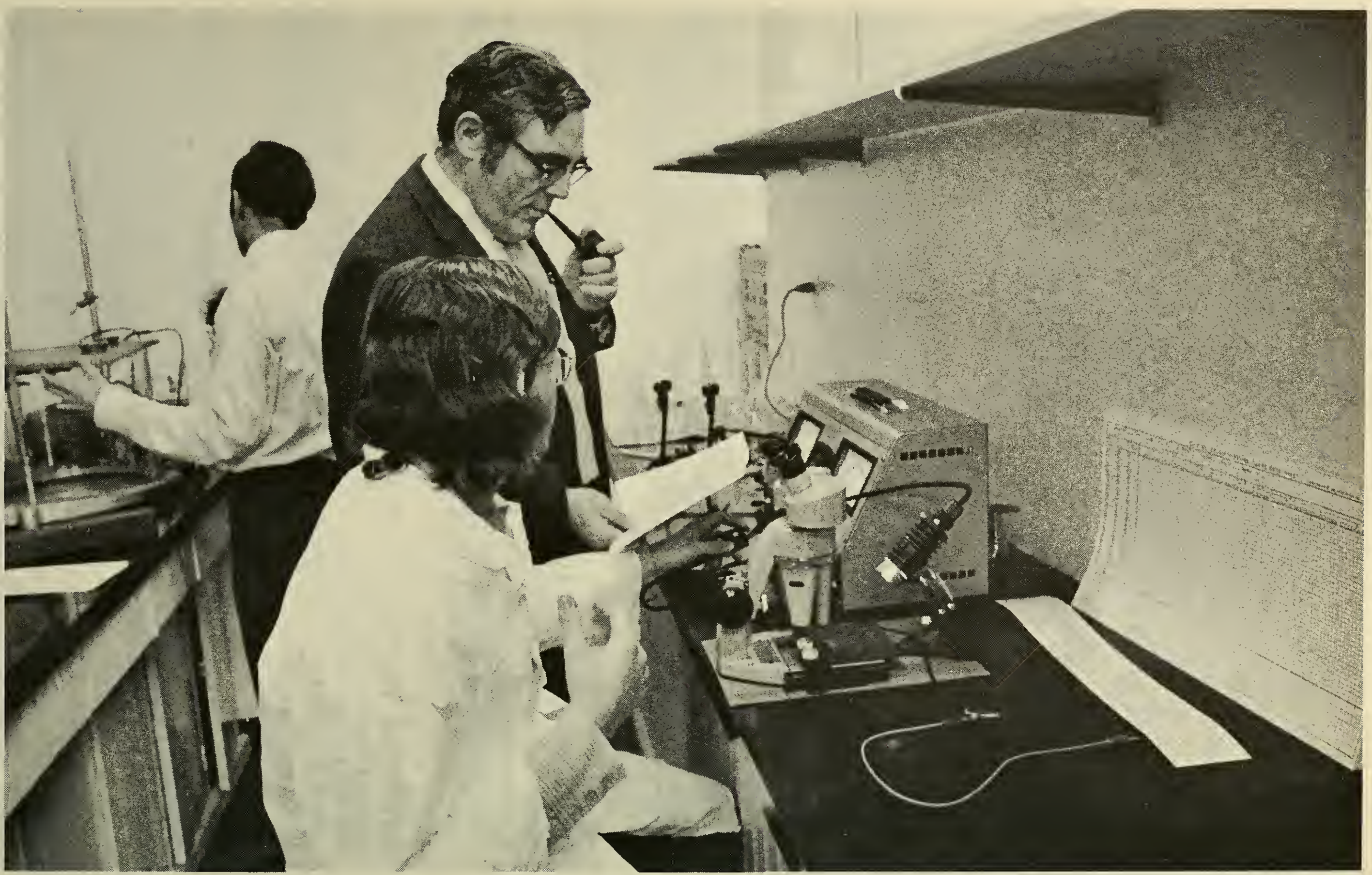
2 hours lecture. Mr. Burris.

The structure and properties of the hair as related to bleaching and coloring; hair coloring classification, formulation, application, and evaluation; consumer acceptance and marketing problems.

Industrial Administration 2701x-2702y. Research planning and coordination.

2 hours lecture. Mr. Kuemmerle. **2 or 3 pts.**

The development of an idea from its conception to the marketing and distribution of a drug or cosmetic product. Extensive use of coordination techniques; planning and communication tools in the total effort; planned procedures organized to maximize research and development; marketing clinicals; quality control; advertising agencies; manufacturing and finance.



LABORATORY EXPERIENCES IN COURSE WORK AND INDEPENDENT STUDY
REINFORCE MATERIAL LEARNED IN LECTURES

BIOLOGICAL SCIENCES AND PHARMACOLOGY

Biological Sciences and Pharmacology 1513x-1514y. General biology. 4½ pts.

3 hours lecture, 3 hours laboratory. Professor Irwin and assistants.

Principles of biology, including historical development and significance of key concepts. Biology examined at the population, organismic, and cellular levels. Topics include evolutionary mechanisms, ecosystems, and biogeography. Homeostasis in the digestive, circulatory, excretory, and secretory systems viewed jointly from morphological and functional aspects. Neuroendocrine interactions, reproduction, differentiation, and basic genetics. Historical development of insight into cell function and molecular biology, protein synthesis and the genetic code, energy metabolism, and immunology. Other topics include human evolution, behavior, the origin of life, and information theory in biology.

Biological Sciences and Pharmacology 1531x-1532y. Mammalian physiology. 3 pts.

2½ hours lecture, 3 hours laboratory, alternate weeks. Professor Staud and assistants.

Prerequisite: *Biological Sciences and Pharmacology 1513-1514* or the equivalent.
Normal living processes of vertebrates, with emphasis on mammalian systems.

Biological Sciences and Pharmacology 1543x. Microbiology. 5 pts.

3 hours lecture, 4 hours laboratory. Professor Hassan.

Prerequisite: *Biological Sciences and Pharmacology 1513-1514* and *Chemistry 1132*, or their equivalents.
Basic microbiology, including morphology, biochemical and physiological activities of bacteria, molds, rickettsia, viruses, and protozoa; with emphasis on the diseases caused, prophylaxis of the pathogenic microorganisms, immunology, and official biological products. Laboratory experiments on these topics.

Biological Sciences and Pharmacology 1545x-1546y. Pharmacology, I and II. 4½ pts.

1545: 3 hours lecture, 3 hours laboratory. *1546:* 4 hours lecture. Professor Merker and assistants.

Prerequisite: *Biological Sciences and Pharmacology 1531-1532* and *Chemistry 1132*, or their equivalents.
The effects of drugs and poisons on normal and diseased mammalian cells, tissues, and organs; the therapeutic uses of drugs in relation to the pathologic state or processes associated with disease. Laboratory exercises emphasize the principles of biological assay and drug testing.

Biological Sciences and Pharmacology 1560y. Pharmacognosy. 4½ pts.

3 hours lecture, 3 hours laboratory. Professor Hassan. (Formerly *Biological Sciences and Pharmacology 1540*)

Prerequisite: *Biological Sciences and Pharmacology 1513-1514* and *Chemistry 1122* and *1132*, or their equivalents.
A study of drugs from biological sources, utilizing the chemical classification, including biogenesis of various plant chemical constituents and official biological drugs, with emphasis on prescription products. Laboratory exercises include morphological study, methods of extraction of various chemical constituents of whole or powdered specimens, and thin-layer chromatographic separation of chemical products.

Biological Sciences and Pharmacology 1563x. Human genetics. 3 pts.

3 hours lecture. Professor Staud.

Prerequisite: the instructor's permission.
Basic concepts of genetics and their application to human heredity.

Biological Sciences and Pharmacology 1564y. Introduction to parasitology. 3 pts.

2 hours lecture, 2 hours laboratory. Professor Mann.

Prerequisite: *Biological Sciences and Pharmacology 1513-1514* or the equivalent.
The animal parasites which cause disease in man and animals. The biology, morphology, host relationships, and epidemiology of the etiological agents associated with parasitoses.

Biological Sciences and Pharmacology 1566y. Endocrinology. 3 pts.

3 hours lecture. Professor Irwin.

Prerequisite: *Biological Sciences and Pharmacology 1531-1532* or the equivalent.
Biogenesis, secretion, and action of hormones, with emphasis on their regulatory and integrative functions.

Biological Sciences and Pharmacology 1567x. Comparative anatomy. 3 pts.

2 hours lecture, 2 hours laboratory. Professor Mann.

Prerequisite: *Biological Sciences and Pharmacology 1513-1514* and the instructor's permission.
Lectures on the evolution of vertebrate organs and systems. Laboratory exercises consist of dissections of representative vertebrates with emphasis on mammalian organs and systems.

Biological Sciences and Pharmacology 1570y. Plant morphogenesis. 3 pts.

2 hours lecture, 2 hours laboratory. Professor Hassan and assistants.

Prerequisite: *Biological Sciences and Pharmacology 1513-1514.*
Study of the plant kingdom from a strictly morphological standpoint. Comparison of the morphological features of lower plants with those of flowering plants. Discussion of life cycles of representative types from various families. Laboratory work involves study of plant materials from the above areas.

Biological Sciences and Pharmacology 3564y. Problems in human genetics.

Seminar. Professor Staud. **2 or 3 pts.**

Prerequisites: *Biological Sciences and Pharmacology 1563* or the instructor's permission.
The exploration of problems relating to human genetic defects.

Biological Sciences and Pharmacology 3565x-3566y. Projects in biological sciences and pharmacology. 2 or 3 pts.

4 to 6 hours conference and laboratory. The staff.

Biological Sciences and Pharmacology 5556y. Clinical pharmaceutics. 3 pts.

1 hour lecture, 3 hours clinical tours. Professor Merker, and Drs. Barland, Libow, Menegaz, and Satz.

Patient response to drug therapy, with emphasis on pharmacologic and therapeutic incompatibilities, adverse drug reactions, and contraindications. Walking, chart, and grand rounds are conducted at affiliated hospitals.

CHEMISTRY

Chemistry 1113x-1114y. General chemistry. 5 pts.

3 hours lecture, 4 hours laboratory. Instructor to be announced.

General laws and theories of modern chemistry and the nature of chemical change. Laboratory exercises illustrate the more important chemical and physical concepts and encompass the theory and practice of qualitative and quantitative chemical analysis.

Chemistry 1121x-1122y. Organic chemistry. 6 pts.

4 hours lecture, 4 hours laboratory. Professor Galton and assistants.

Prerequisite: *Chemistry 1114.*
Corequisite: *Physics 1123-1124* or the equivalent.
A comprehensive course in basic organic chemistry. Structures, properties, syntheses, and reactions of organic compounds, with emphasis on reaction mechanisms. Laboratory exercises employ preparative, synthetic, and instrumental methods to illustrate selected theoretical principles and identify organic compounds.

Chemistry 1131x. Quantitative instrumental analysis. 4 pts.

2 hours lecture, 4 hours laboratory. Instructor to be announced.

Prerequisite: *Chemistry 1122* and *Physics 1124,* or their equivalents.
The theory and application of instrumental and physiochemical approaches to modern quantitative analytical methods. Optical, spectrophotometric, electrometric, and chromatographic methods are considered.

Chemistry 1132y. General biochemistry. **5 pts.**

3 hours lecture, 4 hours laboratory. Professor Patel and assistants.

Prerequisite: *Chemistry 1131* or the equivalent.
The structures, biological functions, biosynthesis, and dynamic metabolic relationships of proteins, polynucleotides, polysaccharides, lipids, hormones, vitamins, and other coenzymes and cellular constituents, with emphasis on the physiochemical laws and biochemical mechanisms governing enzymatic processes and energy metabolism. Laboratory experiments apply modern preparative and quantitative instrumental techniques to chemical, purified enzyme, or tissue homogenate systems to illustrate selected aspects of the lecture material.

Chemistry 1145x-1146y. Medicinal chemistry. **3 pts.**

3 hours lecture. Professor Hite.

Prerequisite: *Chemistry 1132.*
Corequisite: *Biological Sciences and Pharmacology 1545-1546* or the equivalent.
A systematic study of the chemistry of medicinal substances, with attention to the biochemical and pharmacological aspects.

Chemistry 1181x. Chemistry of pollutants. **3 pts.**

3 hours lecture. Professor Patel.

Prerequisite: *Chemistry 1122* or the equivalent.
The sources, amounts, chemistry, and effects on human health of pollutants are considered. Specifically, the science and technology of air pollutants, pesticides, and heavy metals are covered in detail.

Chemistry 3167x-3168y. Projects in chemistry. **2 or 3 pts.**

4 to 6 hours conference and laboratory. The staff.

Chemistry 4136y. Advanced instrumental methods of analysis. **5 pts.**

2 hours lecture, 6 hours laboratory. Professor Casazza and assistants.

Prerequisite: *Chemistry 1131* or the equivalent.
A rigorous treatment of modern spectrometric, electrometric, and radiometric methods of physicochemical measurement, with emphasis on the theory and design of the instrumental and the experimental method.

Chemistry 4172y. Advanced organic chemistry. **3 pts.**

3 hours lecture. Professor Galton.

Prerequisite: *Chemistry 4175* or *4176*, or the equivalent.
Organic reaction mechanisms on the basis of molecular orbital, electronic, and transition state theory and molecular structure, including stereochemistry, with emphasis on spectrometric, kinetic equilibrium, and derived thermodynamic data used to elucidate reaction mechanisms.

Chemistry 4175x-4176y. Physical chemistry, I and II. **3 pts.**

3 hours lecture, 1 hour conference. Professor Vogel.

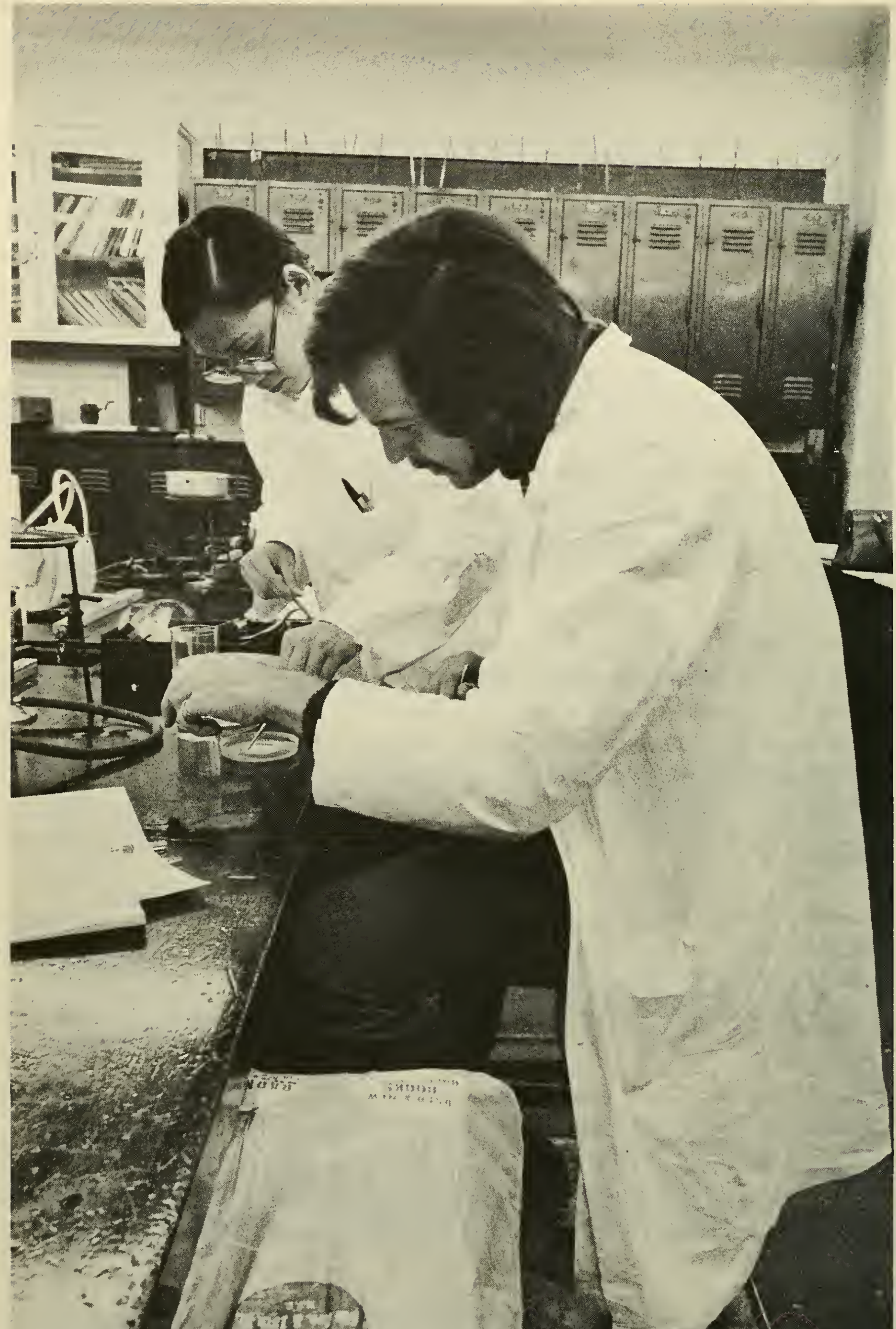
The first half of the course may be taken without the second.
Prerequisite: *Physics 1124, Mathematics 1166,* and *Chemistry 1122,* or their equivalents.
The physical description of chemical species and reactions. *4175:* introduction to modern theories: chemical thermodynamics, kinetic theory and chemical kinetics, and electrochemistry. *4176:* quantum mechanics; atomic and molecular structure; chemical statistics and applications; nuclear and photochemistry.

MATHEMATICS AND PHYSICS (OFFERED BY THE CHEMISTRY DEPARTMENT)

Mathematics 1117x. Elementary functions. **3 pts.**

3 hours lecture, 1 hour conference. Mr. Lutwak.

A review of algebra and an introduction to trigonometric, exponential, and logarithmic functions.



LABORATORY EXPERIMENTATION DEVELOPS STUDENT INITIATIVE

Mathematics 1118y. Calculus, I. **4 pts.**

4 hours lecture, 1 hour conference. Mr. Lutwak.

Prerequisite: *Mathematics 1117* or the equivalent.
Differential calculus, including differentiation of composite functions and of trigonometric, exponential, and logarithmic functions; with applications in rates of change, approximations, maxima and minima, and graphing. Integral calculus, including elementary integration; with application in areas, volumes, arc lengths, moments, pressure, and work.

Mathematics 1165x-1166y. Calculus, II and III. **4 pts.**

4 hours lecture. Mr. Lutwak.

Prerequisite: *Mathematics 1118* or the equivalent.
Hyperbolic functions, techniques and application of integration, parametric representation, polar coordinates, three-dimensional analytic geometry, vector analysis, partial derivatives, multiple integrals, power series, and Taylor series.

Physics 1123x-1124y. General physics. **4 pts.**

2 hours lecture, 2 hours laboratory, and 1 hour conference. Instructor to be announced.

Prerequisite: *Mathematics 1118* or the equivalent.
An introductory course on the results, methods, and spirit of the science.

COMMUNITY HEALTH AND ADMINISTRATION

Community Health and Administration 1321x. Principles of economics. **3 pts.**

3 hours lecture. Mr. Karatzas.

An introduction to economic analysis; functions of the price system, national income, money and banking, economic fluctuations and fiscal policy, supply and demand, competition and monopoly, the development of modern economic systems.

Community Health and Administration 1342y. Public health. **1 pt.**

2 hours conference. Professor Gluck.

The identification and solution of health problems in the community, utilizing principles of epidemiology, demography, biostatistics, and behavioral sciences.

Community Health and Administration 1365x. Principles of marketing. **3 pts.**

3 hours lecture. Professor Marazzi. (Formerly *Administrative Pharmacy 1345*)

Introduction to marketing management, using situations from the pharmaceutical industry. Factors affecting consumer demand and methods of satisfying it; market structure and channels; product policy, including selection and methods of buying; promotion policy, including location analysis, selling, and advertising; pricing policy, including a professional basis; governmental framework of regulation.

Community Health and Administration 1361x. Sales management. **2 pts.**

2 hours lecture. Mr. Gerson.

Prerequisite: *Community Health and Administration 1365.*
Sales and promotional activities conducted by pharmaceutical manufacturers directed to the health professions, and by community pharmacies to the public. Product and claims development for increased sales appeal. Organization and development of the manufacturer's sales force, selection and training of professional service representatives, the functions of the individual detailman.

Community Health and Administration 1362y. Advertising agency procedures.

2 hours lecture. Mr. Popofsky. **2 pts.**

Prerequisite: *Community Health and Administration 1365.*
An insight into pharmaceutical industry advertising techniques and strategy including preparation of advertising campaigns utilizing such media as journals, direct mail, conventions, house organs, and closed circuit T.V.

Community Health and Administration 1363x. Community pharmacy management.

2 hours lecture, 2 hours laboratory. Professor Marazzi. **3 pts.**

Procedures, techniques, and underlying concepts in planning, organizing, directing, and controlling a community pharmacy in the current environment.

Community Health and Administration 1369x. Statistical analysis. 3 pts.

3 hours lecture. Mr. Wittenberg.

An introduction to statistical inference, probability theory, sampling theory, and computer logic and language, with stress on evaluation of data and reports.

Community Health and Administration 1385x. Introduction to health care. 2 pts.

2 hours lecture. Professor Gluck.

An analysis of the problems in the organization, delivery, and financing of health care, and in the education and training for the allied health and health professions. Alternate solutions to these problems currently being proposed are analyzed and discussed.

Community Health and Administration 1386y. Introduction to pharmaceutical services. 2 pts.

2 hours lecture. Professor Gluck.

An analysis of the problems in the organization, delivery, and financing of pharmaceutical services and in the education and training of the various levels of personnel in pharmacy. Alternate solutions to these problems currently being proposed are analyzed and discussed.

Community Health and Administration 3366y. Law in business administration.

3 hours lecture. Mr. Ladimer. **3 pts.**

Prerequisite: the instructor's permission.
Law as a tool of administration: problem-solving and decision-making; avoidance of legal difficulties, promotion of legislative and administrative objectives, substantive law of torts, contracts, property, agency, partnership, corporation, and trade regulation.

Community Health and Administration 3367x-3368y. Seminar in pharmacy administration. 3 pts.

3 hours conference. Professor Marazzi.

Either term may be taken separately.
Prerequisite: the instructor's permission.
Each student selects one of the following fields for intensive study of administrative practice and strategy: manufacturing, wholesaling, retailing, international operations, professional organizations, hospitals and other institutions. A term project and oral reports are required.

Community Health and Administration 3381x, 3382y. Projects in community health and administration. 3 pts.

3 hours conference. Professor Gluck.

Prerequisite: the instructor's permission.
Projects in the identification and solution of problems in the organization, financing, and delivery of health-care and pharmaceutical services in the community.

Community Health and Administration 3383x. Seminar in pharmaceutical management. 2 pts.

2 hours lecture. Professor Keusch.

Prerequisite: *Community Health and Administration 1365.*
Structured to provide an insight into career opportunities in industry. Course content, oriented to role functions in marketing and advertising management, is complemented by guest lecturers from the pharmaceutical industry. Materials relating to implementation of strategies and campaigns are presented.

Community Health and Administration 4371x. Marketing management. 2 pts.

2 hours lecture. Mr. Pfeiffer.

Open to superior fifth-year undergraduate students.
Prerequisite: *Community Health and Administration 1365* and the instructor's permission.
An insight into the market planning function of marketing management. The workings of the product manager system and the team concept are developed. An analysis of the various marketing team members and their functions with emphasis on the step-by-step development of the marketing plan. Presentation of an actual market plan in written and oral form is required.

Community Health and Administration 4382y. Marketing and advertising research.

2 hours lecture. Professor Keusch. **2 pts.**

Open to superior fifth-year undergraduate students.
Prerequisite: *Community Health and Administration 1365* and the instructor's permission.
An insight into research procedures as applied to the marketing and advertising of ethical pharmaceuticals. Topics include the product team concept, promotional mix, strategies and tactics, concept testing, advertising testing, and sampling techniques. The use of surveys, panels, and secondary data sources are also presented.

Community Health and Administration.5353x. Pharmaceutical socioeconomics. 3 pts.

3 hours lecture. Instructor to be announced.

A socioeconomic study of the relation of pharmacy to health care needs, resources, and institutions. Government and private prepayment plans, assistance, and financing.

Community Health and Administration 5356y. Pharmaceutical jurisprudence. 3 pts.

3 hours lecture. Professor Marazzi.

Introduction to the legal system and analysis of laws which relate to the practice of pharmacy and the legal responsibilities of the pharmacist as a member of the health care team.

GENERAL EDUCATION

General Education 1411x-1412y. English. 3 pts.

3 hours lecture. Professor Levin.

Rhetoric and usage, composition, and analysis of literary forms; selected readings in British and American literature.

General Education 1413x. Introduction to philosophy. 3 pts.

3 hours lecture. Professor Lipman.

Fundamental problems in social and ethical philosophy, with class discussion based upon the arguments developed by classical and contemporary philosophers.

General Education 1414y. Introduction to scientific method. 3 pts.

3 hours lecture. Professor Lucas.

A study of the nature of scientific inquiry with illustrations drawn from major achievements of both theory and experiment.

General Education 1421x. Contemporary civilization A. 3 pts.

3 hours lecture. Professor Belaief.

An analysis of nineteenth-century society, with emphasis on the major political, economic, and social changes in Europe and in America. Readings include selections from Rousseau, Marx, Darwin, Nietzsche, and Malthus.

General Education 1422y. Behavioral sciences, I. 3 pts.

3 hours lecture. Professor Belaief.

Our present-day society as viewed and appraised by the social sciences, with emphasis on the impact of technology and industrialization, the distribution of economic powers, the relationships between society and the individual, and kinds of social organization and disorganization. Readings include selections from Freud, Dewey, Gandhi, Galbraith, Riesman, and others.

General Education 1431x or y. Advanced composition and communication. 3 pts.

3 hours lecture. Mr. Thoms.

The purpose of the course is to improve the student's written and verbal communication skills, and to intensify his appreciation of literary style and its importance.

General Education 1442y. American government and law. 3 pts.

3 hours lecture. Instructor to be announced.

An introduction to the politics of policy-making and decision-making in federal, state, and local governmental structures.

General Education 5451x. Behavioral sciences, II. 3 pts.

3 hours lecture. Professor Belaief.

Prerequisite: *General Education 1422.*
The nature of the individual and his situation in the modern world. Materials drawn primarily from psychology, psychoanalysis, and psychiatry, and secondarily from relevant materials in related social sciences such as anthropology and sociology. Emphasis on comparison and appraisal of the various leading theories of individuality.

General Education 5452y. Behavioral sciences, III. 3 pts.

3 hours lecture. Professor Lipman.

Prerequisite: *General Education 1422.*
Alternative theories of the structure of society. Orientation is primarily sociological but includes relevant materials from social psychology, philosophy, and related disciplines.

General Education 1462y. Political ideologies. 3 pts.

3 hours lecture. Professor Lipman.

An introduction to the nature of ideology, and a comparison of the arguments for the major ideologies of the past century: conservatism, liberalism, socialism, and fascism.

General Education 1464y. An introduction to modern poetry. 3 pts.

Professor Lipman.

Given in alternate years.
Nineteenth- and twentieth-century English and American poetry.

General Education 1466y. Principles of ethics. 3 pts.

Professor Belaief.

Given in alternate years.
Readings and discussion in the theory of moral conduct, directed toward inquiry into the foundations of our ethical values, in a secular perspective.

General Education 1468y. Philosophy of religion. 3 pts.

3 hours lecture. Professor Belaief.

The nature of religious experience through analysis of key concepts such as God, immortality, and evil. Readings in Augustine, Kierkegaard, Luther, Tillich, and Eliade.

General Education 1469x. Western literature. 3 pts.

3 hours lecture. Mr. Thoms.

An intensive study of a limited number of major works of Western literature, from ancient times to the present.

General Education 1481x. Abnormal psychology. 3 pts.

3 hours lecture. Professor Lucas.

The nature of mental disorders and inadequacies, and the principles of effective psychotherapy.

General Education 1484x. Introduction to fine arts. 3 pts.

3 hours lecture. Mr. Feder.

A presentation of major works among the plastic arts: painting, sculpture, and architecture, with the aim of encouraging appreciation and understanding.

General Education 1485x. Modern art. **3 pts.**

3 hours lecture. Mr. Feder.

Painting, sculpture, and architecture from the mid-nineteenth century to the present.

General Education 1488y. Principles of logic. **3 pts.**

3 hours lecture. Professor Lipman.

An introduction to the principles of formal reasoning and to the logic of deduction.

General Education 3481x, 3482y. Projects in general education. **3 pts.**

4 to 6 hours conference. The staff.

Individual projects in the humanities or social sciences.

PHARMACEUTICS

Pharmaceutics 1233x. Introduction to physical chemistry. **3 pts.**

3 hours lecture. Professor Rossoff.

Prerequisite: *Chemistry 1122* and *Physics 1124,* or their equivalents.
Fundamental physicochemical principles, with emphasis on thermodynamics, kinetic theory, and equilibria.

Pharmaceutics 1234y. Physical pharmacy and colloid science. **3 pts.**

3 hours lecture. Professor Weiner.

Prerequisite: *Chemistry 1122* and *Physics 1124,* or their equivalents.
Fundamental physicochemical principles applicable to pharmaceutical systems, with emphasis on chemical kinetics, intermolecular interactions, solubility, phase rule, interfacial phenomena, colloids, emulsions, and suspensions.

Pharmaceutics 1241x. Introduction to dosage forms. **2 pts.**

2 hours lecture. The staff.

Prerequisite: *Pharmaceutics 1234.*
The principles underlying modern dosage form design. Emphasis on the pharmacologic and physical-chemical considerations concerning the development and evaluation of pharmaceutical dosage forms.

Pharmaceutics 1244y. Biopharmaceutics. **4 pts.**

2 hours lecture, 4 hours laboratory. Professor Goldberg and assistants.

Prerequisite: *Pharmaceutics 1241* and *1245;* students in the health sciences program may substitute *Pharmaceutics 1234.*
Integration of physical, chemical, and biological principles toward the understanding of effects of dosage forms on absorption, distribution, elimination, and excretion of drugs.

Pharmaceutics 1245x. Pharmaceutical calculations. **1 pt.**

2 hours workshop. The staff.

Elements of pharmaceutical calculations and the preparation of dosage forms requiring the use of pharmaceutical calculations.

Pharmaceutics 1255x. Ancillary dispensing pharmacy. **2 pts.**

2 hours lecture. Mr. Kazdin. (Formerly *Pharmaceutics 5255*)

Specialized nonprescription aspects of dispensing pharmacy, with emphasis on rubber goods, thermometers, hypodermic needles and syringes, diagnostic aids, contraceptives, first-aid materials, surgical supports, intravenous solutions, traction units, specialized diet supplements, oxygen therapy, surgical appliances, physicians' supplies, diabetic needs, and specialized O.T.C. preparations.

Pharmaceutics 1262y. Drug information services. **2 pts.**

2 hours lecture. Dr. Silverman.

Open to fifth-year students only.
Prerequisite: The instructor's permission.
Introduction to the concept of drug information, as a possible professional practice alternative, to give the student practical experience and knowledge in handling the various source materials available. Systems, methods, and applications of drug interactions and drug effects are discussed.

Pharmaceutics 1265x. Introduction to institutional pharmaceutics. **3 pts.**

2 hours lecture, 2 hours laboratory. Field trips to be arranged.

Professors Kleinmann, Mehl, and Simon.

An introduction to hospital organization and related facilities. Goals, standards of practice, policies and procedures, and administration of pharmacy services within and for the institution. The relationship of the pharmacy to other departments. Laboratory consists of visitation to neighboring hospitals and related facilities.

Pharmaceutics 3263x-3264y. Projects in pharmaceutics. **2 or 3 pts.**

4 to 6 hours conference and laboratory. The staff.

Prerequisite: the instructor's permission.

Projects in the area of physical pharmacy, surface chemistry, biopharmaceutics, and hospital pharmacy administration.

Pharmaceutics 4273–4274. Principles of industrial pharmaceutics, I and II. 5 pts. Professor Kanig and assistants. Given in alternate years; not given in 1972–1973.

The principles underlying the unit operations employed in the pharmaceutical industry in the production of all types of dosage forms. Laboratory exercises conducted with pilot plant equipment in the Industrial Pharmacy Laboratory. The physical factors and equipment employed in pharmaceutical manufacturing operations are discussed and evaluated. The influences of the processes and equipment on the biological activity, quality, and stability of dosage forms are emphasized, both in theory and in practice, through special projects.

Pharmaceutics 5253x-5254y. Dispensing pharmacy, I and II. **10 pts.**

3 hours lecture, 4 hours laboratory. Instructor to be announced.

Prerequisite: *Pharmaceutics 1244, 1241,* and *1245.* A single grade for the entire course is given upon completion of both terms.

The application of physico-chemical and biological principles to manufacturing and compounding techniques. Emphasis on comparison of dosage forms, dosage regimens, physical and pharmacological incompatibilities, principles of combination therapy, and patient records.

ELECTIVE COURSES

Depending on his major interests, a student may elect any courses from those listed on pages 19–30 which are not part of his required curriculum. A student interested in graduate study should select electives which prepare him for the program he plans to enter. Students should consult the Chairman of the Committee on Graduate Education or Graduate Professional Education for further information.

Graduate Study in the Pharmaceutical Sciences

Graduate study in the pharmaceutical sciences at Columbia leads to the Master of Science, Doctor of Pharmacy, and Doctor of Philosophy degrees. The M.S. degree program in pharmaceutical sciences, with specializations in the areas of pharmaceutical biology, chemistry, and pharmaceutics, is administered by the College of Pharmaceutical Sciences through its Committee on Graduate Education. The M.S. degree program in administrative pharmacy and the Pharm.D. program in institutional pharmaceutics are administered by the College through its Committee on Graduate Professional Education. The Ph.D. degree program in pharmaceutical sciences is administered by the Executive Committee of the Graduate School of Arts and Sciences, Columbia University, through its Subcommittee on Pharmaceutical Sciences.

For further information on the Ph.D. programs, see pages 37–39.

► THE MASTER OF SCIENCE PROGRAMS

The Master of Science programs are designed for the student who desires to advance his knowledge of the pharmaceutical sciences. To develop creative competence in a given area, the student must undertake a limited research project for the thesis. The M.S. degree is recommended but not required for the Ph.D. degree.

REQUIREMENTS FOR ADMISSION

The applicant must hold a bachelor's degree from an institution approved by the College.

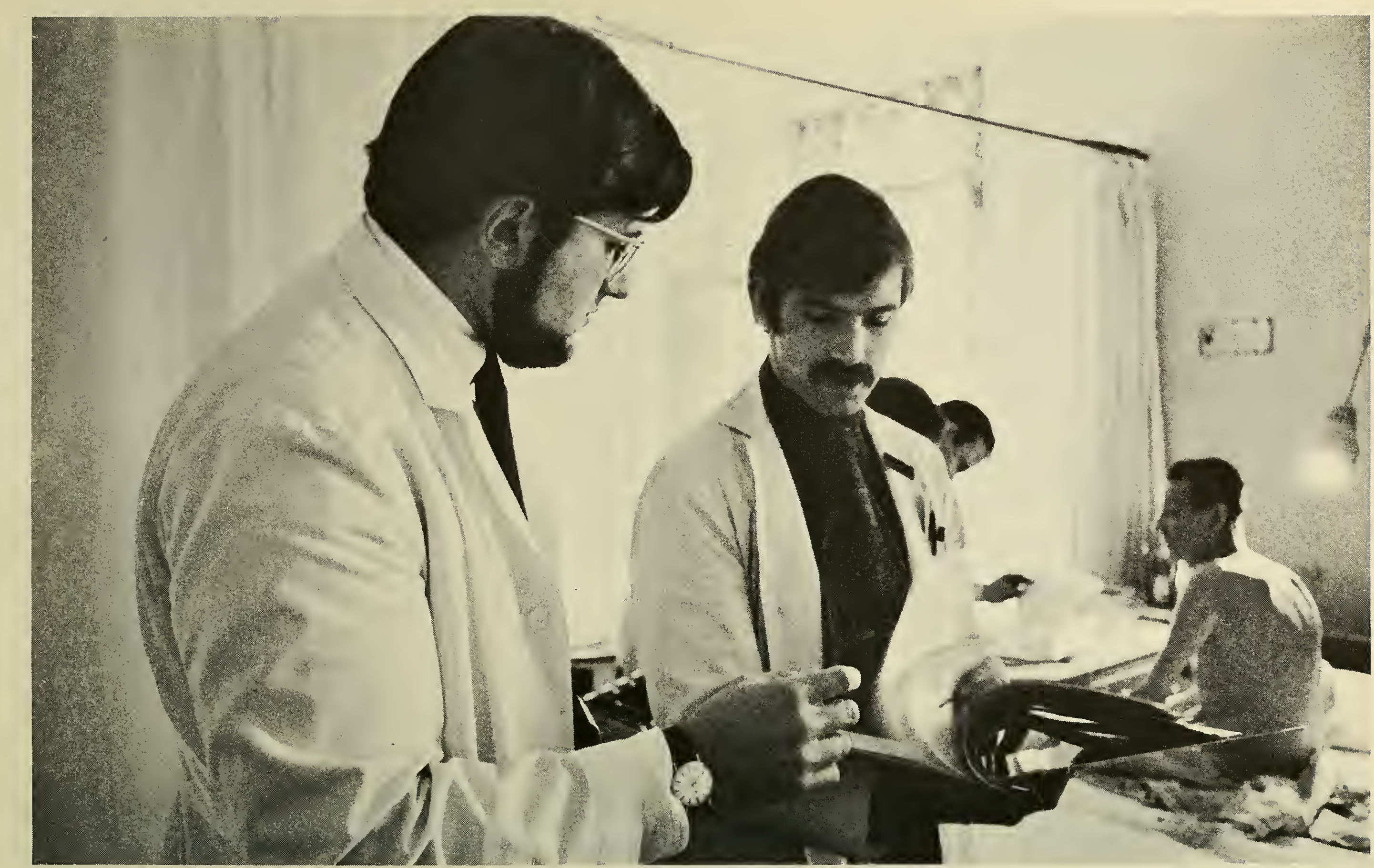
Foreign students must be proficient in writing, reading, and speaking English. They must also take the Test of English as a Foreign Language administered throughout the world by the Educational Testing Service, Princeton, New Jersey 08540, U.S.A.

ADMISSION PROCEDURE

Requests for application forms for admission and financial aid should be addressed to the Director of Admissions, College of Pharmaceutical Sciences, Columbia University, 115 West 68th Street, New York, N.Y. 10023.

An applicant whose undergraduate studies were completed in a foreign country must supply complete certified translations of all his credentials.

New students usually begin their graduate study in September. Applicants are advised to submit their applications and supporting documents before March 1



A PHARM.D. CANDIDATE'S COURSE WORK INCLUDES HOSPITAL ROUNDS
WITH A MEDICAL STAFF MEMBER

of the year in which study is to begin. Students are admitted in the spring or summer terms only if facilities are available and suitable programs can be planned.

PLACEMENT EXAMINATIONS

FOR FOREIGN STUDENTS

A student whose native language is not English must take the English Language Placement Test which is administered by the American Language Program, 211 Lewisohn Hall, Columbia University. The examination is given just before the student registers for his first term in the College. If, in the judgment of the Committee on Graduate Education, a student lacks the necessary command of the English language, he may be required to complete suitable course work in this area. Tuition exemption and tuition remission do not apply to these courses.

FOR ALL M.S. CANDIDATES

All M.S. degree candidates are required to take placement examinations in subjects related to their individual areas of interest before they register for their first term of residence. The results are used in advising students on their programs of study. Students are not required to take placement examinations in areas in which they have had no previous course experience. Following acceptance into the program, they receive pertinent sample placement examinations, study guides, and examination dates.

If, in the judgment of the committee supervising his program, the student's background is incomplete, or if he lacks the orientation required to meet the demands of the more advanced courses, it will be necessary for him to complete more than the minimum number of points of course work prescribed for the degree.

The chairman of each department serves as adviser to first-year graduate students.

FINANCIAL AID

A number of teaching assistantships are granted to M.S. degree candidates on the basis of outstanding achievement. In addition to a $2,750 stipend, the assistantships provide remission of tuition. Remission of tuition applies to all courses except undergraduate courses not available at the College of Pharmaceutical Sciences.

A number of graduate tuition scholarships may be granted to M.S. degree candidates. These scholarships provide tuition exemption and are awarded on the basis of financial need. Tuition exemption applies only to graduate and undergraduate courses available at the College of Pharmaceutical Sciences.

Research fellowships with stipends varying from $2,500 to $5,000 annually also provide remission of tuition. These awards are usually reserved for students who have completed more than one year in residence.

A student who accepts a graduate scholarship, fellowship, residency, or assistantship may accept a scholarship, fellowship, residency, or assistantship from another institution by submitting a written resignation from his first appointment no later than April 14. However, after April 14, a student must obtain a formal release from his first appointment before accepting a second one.

For more detailed information on available financial aid, see pages 59–60.

HEALTH INSURANCE

All students are enrolled in the group health insurance program unless they can prove coverage under a comparable plan. For an additional fee, coverage may be extended to spouses and unmarried children under nineteen years of age who are living in the same household.

LENGTH OF CANDIDACY

A student may not be a candidate for more than five calendar years from the date of first registration. Those who fail to meet the degree requirements within this period, and who wish to continue as degree candidates, must take a comprehensive examination. Following an evaluation of the results, the Committee on Graduate Education will stipulate the requirements and conditions for continuance as a degree candidate.

LEAVE OF ABSENCE

A student who must interrupt his studies for a compelling reason may be granted a leave of absence for a stated period, usually not to exceed one year. The student should request a leave of absence in writing from the dean. If the leave is granted, the student is notified and the fact is entered on his record. The period of a leave of absence is not counted as part of the time allowed for the completion of degree requirements.

MATRICULATION MAINTENANCE FEE

Students for the M.S. and Pharm.D. degrees who have completed all required courses, or who are not registered for any courses, but are doing research or are writing their theses, must register at the beginning of each term and pay a matriculation maintenance fee of $25.

TERMINATION OF CANDIDACY

If a student does not maintain a satisfactory record and rate of progress toward the degree, the Committee on Graduate Education or Graduate Professional Education recommends to the Faculty of Pharmaceutical Sciences that his candidacy be terminated.

REQUIRED COURSES

Required courses differ depending on the area of concentration. The student's program is chosen from an approved list of courses offered by the Faculty of Pharmaceutical Sciences and other departments of the University. Any of the required courses may be waived by the Committee on Graduate Education or

Graduate Professional Education if, in its judgment, equivalent work has been completed elsewhere, or if the student passes an examination without attending the course. No point credit toward the degree is earned through waiver.

ADVANCED STANDING

The Committee on Graduate Education or Graduate Professional Education may approve for credit toward the degree a maximum of 15 points of acceptable graduate work completed elsewhere.

PROGRAM IN PHARMACEUTICAL SCIENCES

Because research areas in the pharmaceutical sciences are diverse and are dependent upon basic physical and biological sciences, the graduate student is encouraged to obtain a sound background in mathematics through differential and integral calculus, physics, chemistry, biology, and physical chemistry. Specialty courses in the areas of pharmaceutical biology, chemistry, and pharmaceutics are offered by the Faculty of Pharmaceutical Sciences. Advanced basic science and applied courses are usually selected from among the offerings of the Graduate School of Arts and Sciences departments of Biological Sciences, Mathematics, Chemistry, Biochemistry, Anatomy, and Chemical Engineering. Illustrative research problems include the design and synthesis of medicinal compounds; absorption, distribution, detoxification, and excretion of drugs; the relationships between the pharmacological activity of drugs and their chemical structures; the physicochemical properties of pharmaceutical systems; the development of methods of analysis of drugs in pharmaceutical systems; the action of drugs on the molecular level; the selective toxicity of anti-microbial agents; the isolation and elucidation of naturally occurring compounds having medicinal value; the factors influencing the stability of drugs; and the factors influencing the availability of drugs to the biological organism.

PROGRAM IN ADMINISTRATIVE PHARMACY

The program is designed for the superior student with a major interest or aptitude in administration. Its purpose is to educate such students for careers of administrative responsibility in all areas of pharmaceutical practice.

Emphasis is on development of sound conceptual and methodological foundations and ability to analyze and solve problem situations.

Students enrolled in this program prepare for executive careers in various aspects of management in pharmaceutical and related industries. The curriculum is adapted to the student's background in pharmaceutical sciences and includes work in enterprise organization, operation, and control; market research; advertising; sales; and administration within government agencies and pharmaceutical associations.

Courses specifically related to the structure and marketing dynamics of the pharmaceutical industry are given at the College of Pharmaceutical Sciences by faculty members and by distinguished leaders in the pharmaceutical industry. Courses concerned with general social and economic business factors are chosen from other divisions of Columbia University. Included in the curriculum are opportunities for intensive study in specialized subjects such as industrial pharmaceutics, business economics, international business, marketing and research, production management and industrial relations, health care institutions, and public law and government.

This program can be completed in three terms of full-time study. When appropriate courses can be scheduled in the Summer Session, it is possible to complete the program within one calendar year. By special arrangement, opportunity for part-time study can be made available.

DEGREE REQUIREMENTS FOR THE PROGRAMS IN PHARMACEUTICAL SCIENCES AND ADMINISTRATIVE PHARMACY

A candidate for the degree of Master of Science in pharmaceutical sciences or in administrative pharmacy is expected to demonstrate mature knowledge of his subject area and must meet the following requirements:

1. He must complete at least 30 points of graduate work at Columbia University in not less than one year of resident study.
2. He must participate satisfactorily in the graduate seminars held during his residency.
3. He must submit and defend an acceptable thesis on his independent research.

► THE DOCTOR OF PHARMACY PROGRAM

The College offers a Doctor of Pharmacy (Pharm.D.) degree program, with a specialization in institutional pharmacy and an emphasis on clinical practice.

The program is designed to prepare students for patient-oriented roles in the institutional environment. Utilizing their undergraduate background in pharmaceutical sciences, students are exposed to more advanced work in pharmacology and related biological disciplines. Course work in these areas, coupled with intensive field work in a hospital, provides students with skills and professional competence to work effectively with other members of the health team. Students are involved in a variety of patient-care activities. These include patient interviews; chart, ward, and grand rounds; and general coordination of drug therapy.

A balanced academic program, including special elective courses, permits cultivation of individual interests.

Three hospitals in New York City—Montefiore Hospital and Medical Center, Lenox Hill Hospital, and Mount Sinai Hospital—are affiliated with the College for the residency program and provide opportunities for students to gain understanding of the entire hospital operation through service in all hospital departments.

ADMISSION

A candidate seeking admission to the Doctor of Pharmacy (Pharm.D.) degree program must have completed the four-year program of course work required for the degree of Bachelor of Science in the health sciences or the five year program of course work required for the degree of Bachelor of Science in the pharmaceutical sciences, or the equivalent thereof. (See page 17 for a description of the health sciences curriculum.) The academic and professional competence of each candidate is determined by the Committee on Graduate Professional Education of the Faculty of the College of Pharmaceutical Sciences. Applicants may be required to appear before this Committee for a personal interview prior to acceptance into the program.

ADVANCED STANDING

The Committee may grant credit toward the degree up to a maximum of 40 points for acceptable equivalent work completed in another institution. A letter from the candidate requesting advanced standing should be directed to the Committee on Graduate Professional Education.

DEGREE REQUIREMENTS

A candidate for the Pharm.D. degree is required to complete a minimum of 80 points of course work beyond that required for the degree of Bachelor of Science in the Health Sciences, be in residence for not less than one academic year, and successfully pass a comprehensive oral examination.

TERMINATION OF CANDIDACY

If a student does not maintain a satisfactory record and rate of progress toward the degree, the Committee on Graduate Professional Education recommends to the Faculty of the College of Pharmaceutical Sciences that his candidacy be terminated.

CURRICULUM

The curriculum consists of a block of required courses and electives. A list of course requirements and suitable electives is supplied to all applicants who make formal inquiry concerning admission to the Pharm.D. program.

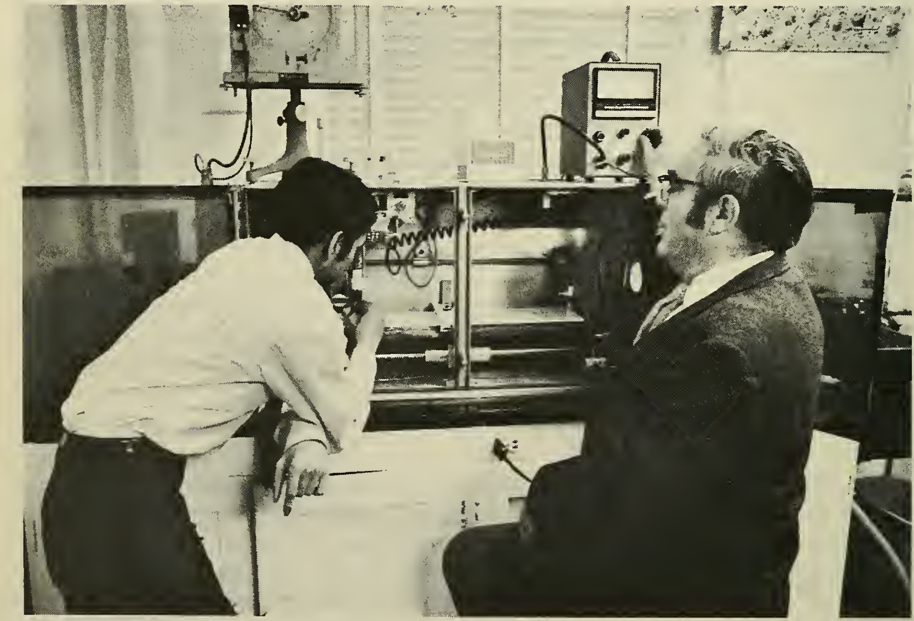
For additional information, contact the Director of Admissions, College of Pharmaceutical Sciences, Columbia University, 115 West 68th Street, New York, N.Y. 10023.

► THE DOCTOR OF PHILOSOPHY PROGRAM

The objectives of the Ph.D. degree program include the acquisition of an advanced knowledge of the fundamental principles of the pharmaceutical sciences and the expansion of this fundamental knowledge through independent research.

A program of study leading to the degree of Doctor of Philosophy will usually require at least three years of full-time graduate work. A student's candidacy for the degree must be certified by the Dean of the Graduate School of Arts and Sciences of the University. Application for certification can be made only after the student meets the general requirements for candidacy.

A GRADUATE STUDENT IN THE CHEMISTRY DEPARTMENT WORKS IN THE NUCLEAR MAGNETIC RESONANCE LABORATORY



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Further details of the admission and degree requirements are given in the bulletin of the Graduate School of Arts and Sciences. Requests for this bulletin and for application forms for admission should be addressed to The Graduate School of Arts and Sciences Office of Admissions and Financial Aid, 106 Low Memorial Library, Columbia University, New York, N.Y. 10027.

► COURSES OF INSTRUCTION AND RESEARCH

The courses listed below are given at the College of Pharmaceutical Sciences. Courses with the "Q" prefix are also listed in the 1972–1973 Graduate School of Arts and Sciences bulletin under the program for the Subcommittee on Pharmaceutical Sciences. See "How Courses Are Numbered" for the significance of the *4000, 6000, 8000,* and *9000* numbering (page 18).

Two hyphenated numbers signify a course that runs through both terms. The first half is prerequisite to the second half unless the course description states otherwise.

The number of points of credit a course carries *each* term is given in boldface type on the right margin of the course entry.

COMMUNITY HEALTH AND ADMINISTRATION

Community Health and Administration 4371x. Marketing management. 2 pts.

2 hours lecture. Mr. Pfeiffer.

Prerequisite: *Community Health and Administration 1365.*
An insight into the market planning function of marketing management. The workings of the product manager system and the team concept are developed. An analysis of the various marketing team members and their functions with emphasis on the step-by-step development of the marketing plan. Presentation of an actual market plan in both written and oral form is required.

Community Health and Administration 4382y. Marketing and advertising research.

2 hours lecture. Professor Keusch. **2 pts.**

Prerequisite: *Community Health and Administration 1365.*
An insight into research procedures as applied to the marketing and advertising of ethical pharmaceuticals. Topics include the product team concept, promotional mix, strategies and tactics, concept testing, advertising testing, and sampling techniques. The use of surveys, panels, and secondary data sources are also presented.

Community Health and Administration 5353x. Pharmaceutical socioeconomics.

3 hours lecture. Messrs. Dimendberg and Sharenow. **3 pts.**

A socioeconomic study of the relation of pharmacy to health care needs, resources, and institutions. Government and private prepayment plans, assistance, and financing.

Community Health and Administration 6331x. Legal regulations of the pharmaceutical industry. 3 pts.

3 hours lecture. Mr. Ladimer.

The FDA—a study of the law, the administrative agency, and procedures. The FTC—imperfect competition and the law.

Community Health and Administration 6342y. Organization of the pharmaceutical industry. 3 pts.

3 hours lecture. Mr. Chefitz.

Structure and dynamics, marketing plans and procedures. Evaluation of policies and trends. Term projects on a particular segment or function of industry required.

Community Health and Administration 6351y. Budgetary control and firm management. 3 pts.

3 hours lecture. Instructor to be announced.

The utilization of managerial budgetary control techniques. Return on investment concepts as a management tool. Problems of leadership and problem planning.

Community Health and Administration 6361x. Biomedical communication. 3 pts.

2 hours lecture. Individual conferences and assignments to be arranged. Professor Martin.

Processing drug information. Developing a medical vocabulary. Medical writing and editing to produce clinical papers, brochures, books, reports, grant applications, and other documents; biomedical communication and drug information problems; computer application in medicine; and developing a drug information center.

Community Health and Administration 9301x-9302y. Colloquium. 0 or 1 pt.

1½ hours to be arranged. The staff.

All graduate students in the administrative pharmacy program must register for this course each term while in residence.
Discussion of current literature and research in pharmacy administration. Practice in casework and problem solving.

Community Health and Administration 9303x or y. Research and thesis. 3 pts.

Hours to be arranged. The staff.

Individual research in various areas of administrative pharmacy.

PHARMACEUTICAL BIOLOGY

Pharmaceutical Biology 4331x. Advanced pharmacology. 3 pts.

3 hours lecture. Professor Merker.

Prerequisite: *Biological Sciences and Pharmacology 1545-1546* or the equivalent.
The mechanism of action of the major classes of drugs presented from a quantitative point of view. Experimental data are studied to gain insight into the rationale underlying accepted theories of drug action.

Pharmaceutical Biology 6521x. Principles of biological assay. 3 pts.

1 hour lecture, 4 hours laboratory, to be arranged. Professor Merker.

Prerequisite: pharmacology.
The quantitative standardization of drugs by biological methods and the application of statistical methods of analysis to biological experimentation.

Pharmaceutical Biology Q6525x-Q6526y. Modes of drug action. 3 pts.

3 hours lecture. Professors Goldberg, Hite, Merker, Rosoff, and Weiner.

Prerequisite: pharmacology, advanced biochemistry, and *Chemistry G4092.*
The relation of physical and chemical properties of drugs to their biologic action and a physiochemical treatment of the factors involved in biological response. Topics include relation of molecular constitution and molecular properties of structurally specific drugs to their biologic activity, the physical properties of structurally nonspecific compounds, interaction between drugs and enzyme systems, physical effects which modify the degree of drug action, absorption of molecules and ions through membranes and transport in body fluids, detoxification, drug resistance, synergism, and potentiation.

Biological Sciences and Pharmacology 6574y. Introduction to pathology. 3 pts.

2 hours lecture, 1 hour conference. Professor Merker and associates.

Prerequisite: *Biological Sciences and Pharmacology 1531-1532* and *1543* and *Chemistry 1132,* or their equivalents.
A presentation of general and special pathology. Lectures supplemented with gross specimens to illustrate pathologic changes which occur in organ systems. Histologic diagnosis is not emphasized.

Biological Sciences and Pharmacology 6501x. Neurobiology. 3 pts.

3 hours lecture and discussion. Professor Irwin.

Prerequisite: the instructor's permission.
Historical development and current study of basic issues in neurobiology. Topics selected to fit the background and interests of the students. Lectures provide an overview and students report on readings from current research literature. Topics range from comparative neuroanatomy to biochemical correlates of information and processing.

Biological Sciences and Pharmacology 9502y. Seminar in neurobiology. 1 or 2 pts.

1 or 2 hours discussion. Professor Irwin.

Prerequisite: the instructor's permission.
Selected areas of current research in neurobiology. Students report on readings from the literature.

Pharmaceutical Biology Q9503x-Q9504y. Special problems. 1 or 3 pts.

Hours to be arranged. The staff.

PHARMACEUTICAL CHEMISTRY

Chemistry 4136y. Advanced instrumental methods of analysis. 5 pts.

2 hours lecture, 6 hours laboratory. Professor Casazza and assistants.

Prerequisite: *Chemistry 1133* or the equivalent.
A rigorous treatment of modern spectrometric, electrometric, and radiometric methods of physicochemical measurement, with emphasis on the theory and design of the instrumental and the experimental method.

Chemistry 4172y. Advanced organic chemistry. 3 pts.

3 hours lecture. Professor Galton.

Prerequisite: *Chemistry 4175* or *4176*, or the equivalent.
Organic reaction mechanisms on the basis of molecular orbital, electronic, and transition state theory and molecular structure, including stereochemistry, with emphasis on spectrometric, kinetic equilibrium, and derived thermodynamic data used to elucidate reaction mechanisms.

Chemistry 4175x. Physical chemistry, I. 3 pts.

3 hours lecture, 1 hour conference. Professor Vogel.

Prerequisite: *Physics 1124, Mathematics 1166,* and *Chemistry 1122,* or their equivalents.
The physical description of chemical species and reactions. Introduction to modern theories: chemical thermodynamics, kinetic theory and chemical kinetics, and electrochemistry.

Chemistry 4176y. Physical chemistry, II. 3 pts.

3 hours lecture, 1 hour conference. Professor Vogel.

Prerequisite: *Physics 1124, Mathematics 1166,* and *Chemistry 1122* and *4175,* or their equivalents.
The physical description of chemical species and reactions. Quantum mechanics; atomic and molecular structure; chemical statistics and applications; nuclear and photochemistry.

Pharmaceutical Chemistry Q4101x. Radioisotopes in the pharmaceutical sciences. 3 pts.

2 hours lecture, 3 hours laboratory, to be arranged. Instructor to be announced.

An introduction to the properties of radioisotopes and the characteristics of radiation. Production and standardization of radioisotopes, detection and measurement of radiation, radiation dosimetry and shielding, precautions in the handling of radioisotopes, and preparation of radioisotope-labeled compounds. Radioisotopes used in medicine, sterilization with radiation and radioisotopes, and the application of radioactive tracers to research problems. Laboratory experiments include methods of radiation detection, utilizing Geiger-Müller, proportional gas flow, and scintillation counters; the preparation of samples for measurement; gamma-ray spectrometry; determination of isotope distribution in living tissue; isotope dilution methods; and the application of radioisotopes to pharmaceutical research.

Pharmaceutical Chemistry Q6111x. Selected topics in instrumental analysis. 3 pts.

1 hour lecture, 6 hours laboratory, to be arranged. Professor Patel.

Prerequisite: *Chemistry 4136* and *G4091-G4092,* or their equivalents.

Topics include nuclear magnetic resonance, and infrared, ultraviolet, and fluorescence spectroscopy.

Pharmaceutical Chemistry Q6112y. Electroanalytical chemistry. 3 pts.

1 hour lecture, 6 hours laboratory, to be arranged. Instructor to be announced.

Prerequisite: *Chemistry 4136* and *4175.*

Conductometric, potentiometric, coulometric, and amperometric titrations, polarography, and chronopotentiometry.

Pharmaceutical Chemistry Q6208x. Kinetics in homogeneous systems. 2 pts.

2 hours lecture. Professor Vogel.

Prerequisite: *Chemistry G4091-G4092,* or *4175-4176,* or their equivalents.

Rates and orders of reactions in homogeneous systems; the collision theory and theory of absolute reaction rates; detailed analysis of catalysis involved in pharmaceutical systems; experimental methods.

Pharmaceutical Chemistry Q6223x-Q6224y. Advanced medicinal chemistry. 2 pts.

2 hours lecture. Professors Hite and Patel.

Structures, properties, syntheses, and reactions of selected naturally occurring and related medicinal compounds, with emphasis on the methods of structure elucidation. The application of physical methods —including optical rotation; ultraviolet, visible, and infrared absorption spectra; dipole moments; and dissociation constants—to structure determination. The establishment of the stereochemistry of certain compounds by conformational analysis and other methods. The assignment of pharmacophoric groups.

PHARMACEUTICAL SCIENCES

Pharmaceutical Science Q9801x-Q9802y. Seminar. 0 or 1 pt.

1½ hours to be arranged. The staff.

All graduate students must register for this course while in residence.
Discussion of current research in the pharmaceutical sciences.

Pharmaceutical Science Q9807x-Q9808y. Research. Points variable.

The staff.

Pharmaceutical Science S9809A. Research. May 22—Sept 8. Points variable.

The staff.

PHARMACEUTICS

Pharmaceutics Q4273-Q4274. Principles of industrial pharmaceutics. 4 pts. Professor Kanig. Given in alternate years; not given in 1972–1973.

Theoretical and experimental analysis of problems associated with principles and methods of formulating and developing medicinal dosage forms. Emphasis on laboratory work in the application of recent advances to problems on the industrial pharmaceutical level.

Pharmaceutics 6201x-6202y. Institutional pharmaceutics. 3 pts.

3 hours lecture. Professor Mehl.

Prerequisite: *Pharmaceutics 1265* or the equivalent.

An in-depth analysis of hospital organization and related facilities. Goals, standards of practice, policies and procedures, and administration of pharmacy services within and for the institution. The relationship of the pharmacy to other departments.

Pharmaceutics 6203x. Advanced institutional pharmaceutics, I. **6 pts.**

Professors Kleinman, Mehl, and Simon, and assistants.

Minimum time allocation: 20 hours *each week.*
Given at an affiliated hospital.
Intensive study of pharmaceutical services in an institutional setting. Administrative aspects of the components of pharmacy service are explored.

Pharmaceutics 6204y. Advanced institutional pharmaceutics, II. **6 pts.**

Professors Kleinman, Mehl, and Simon, and assistants.

Minimum time allocation: 20 hours *each week.*
Given at an affiliated hospital.
Students may elect to concentrate on pharmacy administration, clinical pharmaceutics, or pharmaceutical production and dispensing to obtain more intensive training in areas of special interest. A written project report on the selected area is required.

Pharmaceutics 6205x. Clinical pharmaceutics, I. **6 pts.**

Professors Kleinman, Mehl, and Simon.

Minimum time allocation: 20 hours *each week.*
Prerequisite: *Pharmaceutics 6215* and *6216* or their equivalents.
The pharmacist's role on the patient-care unit, and his interaction with other health-care professionals in the clinical setting.

Pharmaceutics 6206y. Clinical pharmaceutics, II. **6 pts.**

Professors Kleinman, Mehl, and Simon.

Minimum time allocation: 20 hours *each week.*
Students are assigned to patient-care units to carry out activities discussed in *Pharmaceutics 6205.*

Pharmaceutics Q6211x. Homogeneous systems. **2 pts.**

2 hours lecture. Professor Rosoff.

Prerequisite: *Chemistry G4091-G4092,* or *4175-4176,* or their equivalents.
The physical properties of homogeneous pharmaceutical systems, in terms of modern theories fo solution which utilize the properties of the liquid state as their basis. The applications of thermodynamic principles to elucidate the formation and the characteristics of ideal and real solutions and factors influencing equilibria in these solutions.

Pharmaceutics Q6213x. Heterogeneous systems. **3 pts.**

3 hours lecture. Professor Rosoff.

Prerequisite: *Chemistry G4091-G4092,* or *4175-4176,* or their equivalents.
Modern views of the colloid state; preparation of colloids; nucleation, growth and coagulation, aspects of sedimentation and flocculation; electric properties of colloids, electrokinetics, origin and effect of charge, structure of double layer; stability of lyophobic and lyophilic colloids, aerosols and foams; Newtonian and non-Newtonian rheological behavior; micromeretics.

Pharmaceutics 6214. Interfacial phenomena. 3 pts. Professor Weiner. Given in alternate years; not given in 1972–1973.
A structural and theoretical consideration of interfacial phenomena; thermodynamics of surfaces, orientation at an interface, capillary pressure, Gibbs adsorption isotherm, properties of monomolecular films, with particular reference to rates of reaction and penetration; the electrical aspects of surface chemistry, including the electrical double layer, zeta potential, and electrocapillarity; the surface of solids, adsorption of gases and vapors by solids, with a discussion of the Langmuir and Brunauer, Emmett and Teller adsorption isotherms; solid-liquid interfacial free energy, contact angles, heat of immersion and adsorption from solution; structure and properties of micelles, with emphasis on theoretical consideration of solubilization.

Pharmaceutics 6215x. Biopharmaceutics. **2 pts.**

2 hours lecture. Professor Goldberg.

Prerequisite: *Chemistry G4091* or *4175,* or their equivalents.
The biophysicochemical factors which influence the kinetics of drug absorption, distribution, metabolism, and excretion, and the role of the dosage form and its component parts in the absorption process. Current *in vitro* and *in vivo* methods of dosage form evaluation, in relation to the biological availability of active ingredients. The design of dosage forms, their physical stability and biological availability.

Pharmaceutics 6216y. Pharmacokinetics. **2 pts.**

2 hours lecture. Professor Goldberg.

Prerequisite: *Chemistry G4091* or *4175,* or their equivalents.

Quantification of the time course of the absorption, distribution, metabolism, and elimination of drugs. The uses of blood level and urinary excretion data are discussed in terms of dosing and dosage regimens. Modelling and the kinetics of pharmacologic response are studied along with the effects of dosage form and routes of administration. Clinical implications are focused on whenever feasible.

Pharmaceutics Q6284. Chemical thermodynamics. 3 pts. Professor Rosoff. Given in alternate years; not given in 1972–1973.

Prerequisite: *Chemistry 4175-4176* or the equivalent.

Thermodynamics of solutions, small systems, surfaces, and adsorption phenomena. Osmotic pressure, Donnan equilibrium, and irreversible thermodynamics are also discussed.

Pharmaceutics Q9203x-Q9204y. Special problems. **1 to 3 pts.**

Hours to be arranged. The staff.

Pharmaceutics 9205x-9206y. Seminar. **1 pt.**

1 hour conference. Professors Kleinmann, Mehl, and Simon.

Primarily for Pharm.D. degree candidates.

Discussions, readings, and seminars by students and guest lecturers on topics of current interest in institutional pharmacy and medicine. Students are required to present seminars based on literature searches or on their original findings.

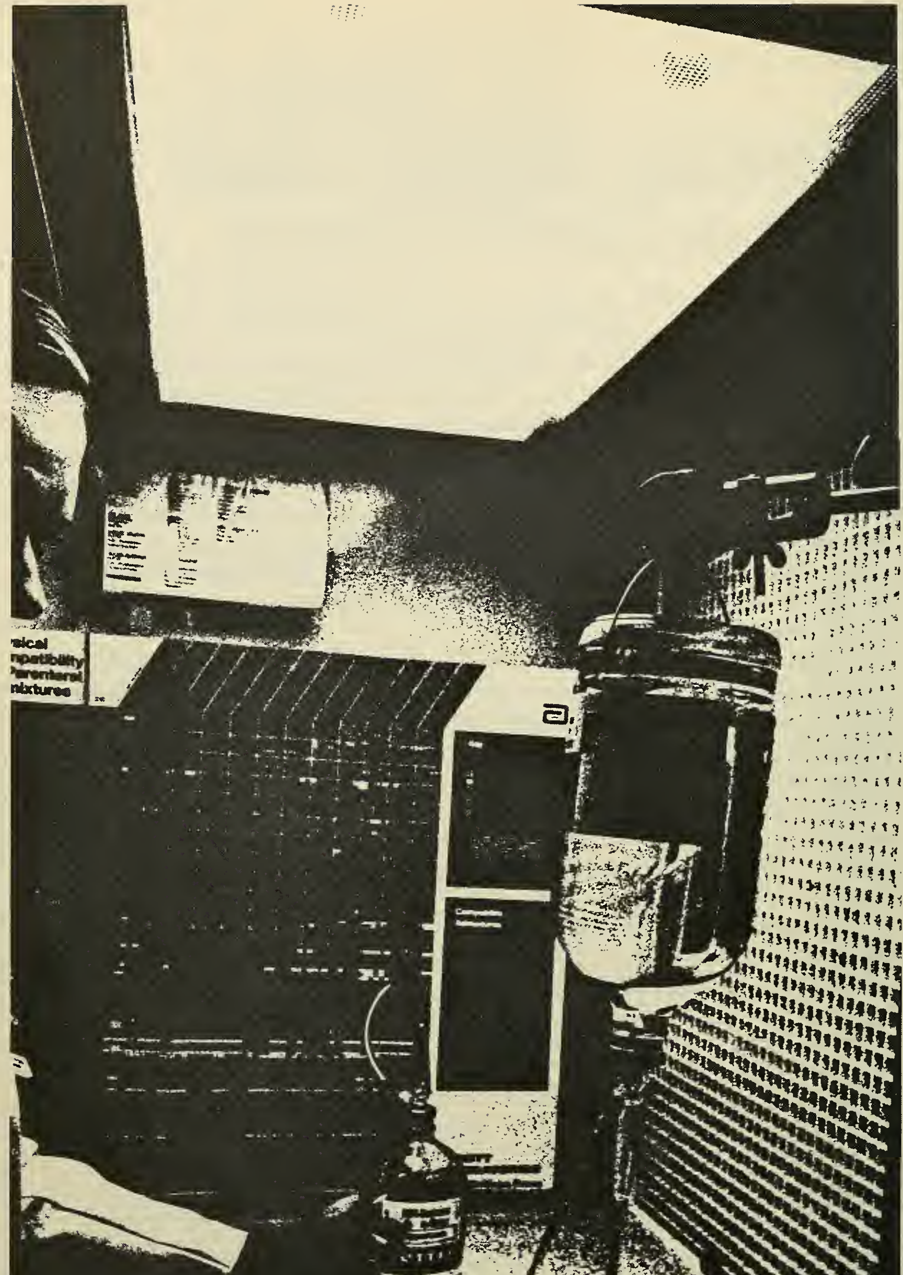
Evening Program in Applied Pharmaceutical Sciences

The College of Pharmaceutical Sciences program in applied pharmaceutical sciences provides a unique educational experience for individuals with research or administrative responsibilities within the pharmaceutical, cosmetic, and allied industries. The growth and expansion of these industries, accompanied by increasing diversification, makes it highly desirable for individuals to keep abreast of the latest developments in their specialized areas. In a coordinated program designed to meet the immediate needs of industry and its personnel, the College of Pharmaceutical Sciences has sought to bridge the educational gap that exists between college education and practical industrial experience. These courses, taught by distinguished industrial and academic leaders, have been structured to present subjects of industrial importance.

A number of evening courses have been approved by the Faculty for undergraduate elective credit at no extra cost to the student. These special courses are listed under Applied Sciences and Industrial Administration on page 19. For additional information consult the Director of Extension Services or the Director of Student Affairs.

The Columbia University Certificate in Applied Pharmaceutical Sciences is awarded to students who complete 30 points of course work in this program, provided all other requirements are met. It is also possible to register for individual courses.

For additional information, consult or write the Director of Admissions or the Director of Extension Services, College of Pharmaceutical Sciences, 115 West 68th Street, New York, N.Y. 10023.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Registration and Expenses

► REGISTRATION

During the registration period at the beginning of each term, each student must register for the courses he proposes to take during that term. Before registration, each student receives a notice specifying when and where he is to report.

All students are asked to give social security numbers when registering in the University. Those who do not now have a number should obtain one from their local social security office well in advance of registration.

Late registration is permitted only upon the payment of an additional fee of $25 and if satisfactory cause for the delay can be shown.

A veteran who expects to have his expenses defrayed under Veterans Administration regulations must present his certificate of eligibility at the time of registration.

► FEES

Tuition and fees are due at registration and must be paid by check or money order; cash is not accepted. Unless full payment is made, admission to classes is not possible. The tuition and fees given below apply only to the College of Pharmaceutical Sciences. Students who plan to take courses in other divisions of the University should consult the fee schedules in the appropriate bulletins.

All graduate students are required to pay the composite graduate fee.

Arrangements for financial assistance (such as State-guaranteed loans through local financial institutions or deferred payment plans) are the responsibility of the student. The College will accept only written documentation from the lending institution as evidence to support requests for deferment of fees at registration.

TUITION FOR UNDERGRADUATE STUDENTS

For a program of less than 12 points, per point	$ 70.00
For a full program, per term (12 to 20 points; includes laboratory and composite fees)	1,000.00
For each point in excess of 20	70.00

OTHER FEES FOR UNDERGRADUATE STUDENTS

Laboratory fee, per course (for a program of less than 12 points)	25.00
Composite fee, per term (for a program of less than 12 points)	50.00
Application for a degree	20.00
Health insurance, per year (payable in the autumn term), optional	27.50
Late registration	25.00
Transcripts (each)	2.00

TUITION FOR GRADUATE STUDENTS

For a program of less than 12 points, per point	$ 70.00
For a full program, per term (12 to 20 points; includes composite fee)	825.00
For Pharm.D. degree candidates, per term	750.00
For each point in excess of 20	70.00

OTHER FEES FOR GRADUATE STUDENTS

Registration fee (for a program of less than 12 points), per term	10.00
Matriculation maintenance fee, per year	25.00
Health insurance, per year (payable in the autumn term)*	27.50
Application for a degree	20.00
Transcripts (each)	2.00
Late registration fee, per term	25.00
Composite fee (for graduate tuition scholars and teaching assistants), per term	100.00

ADJUSTMENT OF FEES

When urgent reasons compel a student to withdraw from the College, a partial refund of tuition *may* be authorized. Any adjustment of fees is calculated from the date the Director of Student Affairs receives *written* withdrawal forms. Fees are refunded as follows:

	Percentage of Tuition Refunded
First week of classes	80
Second week of classes	60
Third week of classes	40
Fourth week of classes	20
Fifth week of classes and those following	0

BOOKS AND SUPPLIES

It is estimated that $600 will cover the cost of the textbooks and necessary apparatus required for the program leading to a B.S. degree.

► STUDENT EMPLOYMENT

Students seeking employment should consult Mr. Stephen M. Gross, Associate Dean.

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*The health insurance fee may be waived if the student exhibits evidence of coverage under personal health insurance policy.

► STUDENT LOAN FUNDS

A number of sources are available for loans. Those of particular interest are available from the Women's Auxiliary of the Pharmaceutical Society of the State of New York, the John W. Dargavel Foundation, the Women's Auxiliary of the American Pharmaceutical Association, the New York Higher Education Assistance Corporation, the Cuban Loan Program, and the National Defense Student Loan program. The College participates in many special student aid programs sponsored by the federal or state governments. Tuition payment plans are also available through many New York City banks.

Complete details may be obtained from the Director of Student Affairs, College of Pharmaceutical Sciences, Columbia University, 115 West 68th Street, New York, N.Y. 10023.

► HOUSING

Inexpensive housing near the College is increasingly difficult to obtain. Students who will not be living at home should make housing arrangements well in advance of the time they enter the College. *Such arrangements are the responsibility of the student.*

Student Life

► STUDENT ORGANIZATIONS

THE STUDENT COUNCIL

The Student Council in the College of Pharmaceutical Sciences consists of elected representatives from the different classes. It cooperates with and is responsible to the Director of Student Affairs and the Joint Student-Faculty Committee in the supervision of student interests and activities.

PHARMACEUTICAL ASSOCIATION AND THE AMERICAN CHEMICAL SOCIETY

The student chapters of the American Pharmaceutical Association and the American Chemical Society bring to the attention of students the professional activities, the advances, and the problems of the American pharmacist and chemist by means of lectures by prominent guests and by contests, professional displays, and other programs. Membership fees include subscriptions to the monthly journals published by the parent organizations. The A.Ph.A. chapter is also active in the affairs of the International Pharmaceutical Students Federation, participating in their exchange program and having representation in the annual convention.

SPECIAL INTEREST GROUPS

Anyone who wishes to inaugurate a new activity may do so by contacting the Director of Student Affairs who will be happy to help organize the event or group.

FRATERNITIES AND SORORITIES

The following fraternities maintain active chapters at the College: Kappa Psi, Rho Pi Phi, Delta Sigma Theta, and Alpha Zeta Omega. One sorority is active at the College. Students are also invited to join fraternities on the Morningside campus.

► STUDENT COUNSELING

Academic advisement is handled by the chairman of the Instruction Committee. All other matters of concern to students may be brought to the attention of the Director of Student Affairs who is coordinator of student activities, student records, foreign student advising, financial aid, and personal counseling.

Various faculty members, appointed by the Dean, are advisers to individual organizations and classes. All members of the faculty and administration are available to consult with students on any matters of concern to them. More detailed information on the counseling program is contained in the student handbook.

Protestant, Roman Catholic, Jewish, and other religious counselors and advisers are available for consultation in their offices in Earl Hall on the Morningside campus.

Students are invited to attend the daily services held in St. Paul's Chapel and the meetings, lectures, and activities of the various religious organizations.

► FOREIGN STUDENTS

The Director of Student Affairs handles all questions concerning the United States Immigration and Naturalization Service and requests for all types of certification to be used for immigration, foreign exchange, and other purposes.

Students are invited to participate in the social activities of The Foreign Student Center, which is on the Morningside campus.

ORIENTATION PROGRAM FOR NEW FOREIGN STUDENTS

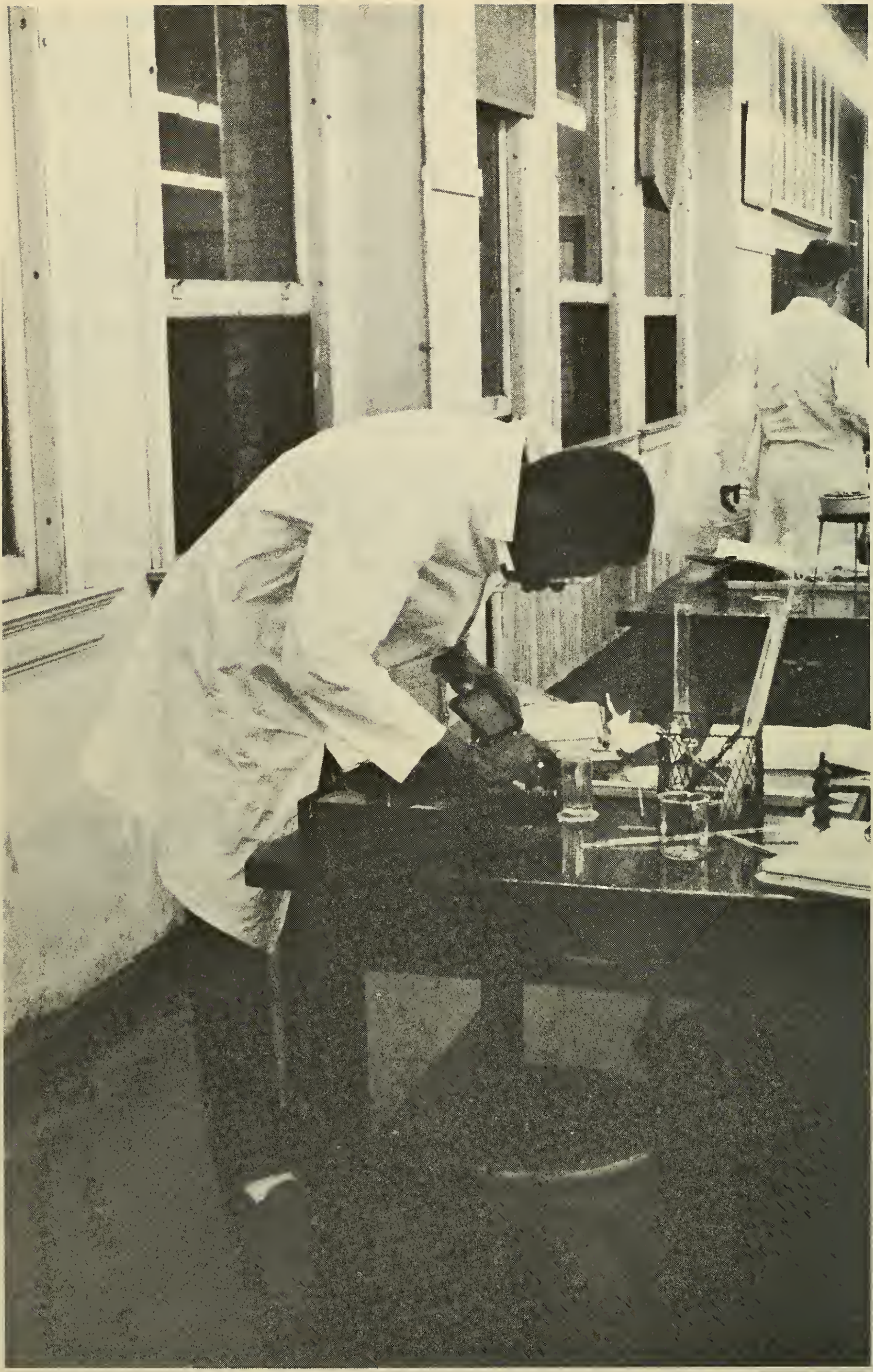
The orientation program for new foreign students is held each fall to introduce students to the University and to New York City. The program includes the English Language Placement Test, information about registration, tours of the Morningside campus and its libraries, a reception to meet the President of the University, and an opportunity to visit an American family.

For dates of the orientation program, see the Academic Calendar. Although not required to attend, all foreign students are invited to participate in any or all parts of the orientation program.

► LIBRARIES

The libraries of the University, which are available to all students, contain over 4,000,000 volumes, exclusive of unbound pamphlets. The main collection is housed in the Nicholas Murray Butler Library on 114th Street near Broadway. The various departments of instruction have special libraries to serve their needs. The Chemistry Library in Chandler Laboratories, the Physics Library in Pupin Physics Laboratories, the natural science libraries (geology, psychology, zoology, and botany) in Schermerhorn Hall, and the Medical Library at 168th Street and Broadway are of particular interest to students in the College of Pharmaceutical Sciences.

The library of the College of Pharmaceutical Sciences contains more than seventeen thousand volumes, including reference works on pharmacy and allied branches of science as well as an extensive series of periodicals in English and in foreign languages relating to chemistry, pharmacy, botany, and allied sciences, including all important journals of interest to the health sciences professions.



Honors and Awards

The College of Pharmaceutical Sciences reserves the right to withhold the award of any honor, scholarship, or prize if in its opinion no candidate has exhibited qualifications justifying the award or if the amount of the accumulated income in the fund is insufficient.

Financial aid programs are administered without regard to race, creed, color, national origin, or sex.

► UNDERGRADUATE HONORS AND AWARDS

Students who demonstrate outstanding scholastic ability and personal attributes become eligible for nomination to the Dean's List, for election to Rho Chi Society, and for the several scholarships, prizes, and awards described on pages 54–60.

The Dean's List, prepared at the close of each term, bears the names of those students whose Merit Rating Index is 3.4 or higher for that term.

Rho Chi Society, the national pharmaceutical honor society, has as its fundamental objective the advancement of the pharmaceutical sciences through encouragement and recognition of high scholarship. Students who have achieved upper junior and senior status and whose scholarly and personal attainments have met the high standards of Rho Chi, are eligible for nomination to membership. On the same basis, the privilege may be extended to graduate students and alumni of the College of Pharmaceutical Sciences.

HONORS PROGRAM

The College of Pharmaceutical Sciences is motivated by a desire to provide instruction to students of diversified abilities. Within the framework of this obligation the College also recognizes the development of the superior student because he serves as a stimulus for other students, and in so doing contributes to the intellectual leadership of the health professions.

The purpose of the Honors Program is to enable especially capable freshmen and upperclassmen who have shown superior scholastic achievement to participate in intensive specialized work under the guidance of members of the faculty. Those students who fulfill the program's requirements will receive special honors, which will be inscribed on their diploma upon graduation.

Thus, the Honors Program is conceived as a challenge to outstanding students to assume responsibilities equal to their abilities.

For further information, contact the Director of Student Affairs.

► UNDERGRADUATE SCHOLARSHIPS AND PRIZES

SCHOLARSHIPS FOR NEW STUDENTS

One half of the amount of all scholarships is credited toward payment of tuition for the autumn term; the balance is credited toward payment of tuition for the spring term if a satisfactory average is maintained and the need continues.

New York State Awards. New York State offers various types of financial assistance to qualified college students who are state residents. Information may be obtained from the Office of Admissions or by writing to the Department of Education, Regents Examination and Scholarship Center, Albany, N.Y. 12201. *Regents College Scholarships* carry awards of $250 to $1,000 a year depending on need; a candidate should consult his high school guidance counselor or principal for instructions on how to apply. *Scholar Incentive Awards* have a value of $100 to $500 depending on need. Application for awards should be filed with the Regents Examination and Scholarship Center two months in advance of the beginning of the term for which the grant is to apply.

SCHOLARSHIPS FOR UPPERCLASSMEN

The general basis for the selection of scholarship recipients is character, scholastic aptitude, and need. The specific requirements are described under each scholarship.

One half of the amount of all scholarships will be credited toward payment of tuition for the autumn term; the balance will be credited toward payment of tuition for the spring term if a satisfactory average is maintained and the need remains.

GENERAL

Alumni Association Scholarships, established by the Scholarship Aid Fund, Inc., of the Alumni Association of the College of Pharmaceutical Sciences, provide tuition scholarships of $500 each to undergraduates. Eligibility is based on financial need and demonstrated potential for scholarly attainment. Two such awards are made annually.

The *Samuel A. Dryer Scholarship,* established through a bequest of Samuel A. Dryer, Class of 1911, is provided to a worthy student of the College on the basis of financial need, scholarly ability, and the personal qualifications of the applicant for the practice of pharmacy. The value of the award is about $250, the annual income of the fund, to be applied toward tuition.

The *Health Professions Scholarships,* established by the Federal Health Professions Educational Assistance Amendments of 1965, are awarded annually to students in the Pharmaceutical Sciences program. The purpose of the scholarships, which may not exceed $2,500 each in any one year, is to enable talented students requiring financial assistance to undertake the course of study required to enter the pharmaceutical profession. These scholarships are available only to students who would be unable to pursue the required studies without financial assistance.

The *Samuel J. Moritz Scholarship,* provided through bequest and having a value of approximately $200, is awarded annually to a student enrolled in the College of Pharmaceutical Sciences.

The *Murray Wollan Memorial Fund,* established by the family and friends in honor of Murray Wollan, Class of 1920, who distinguished himself by the high level of his long professional practice, provides assistance to worthy students for the purchase of textbooks and supplies.

SECOND YEAR

The *Alexander Block Memorial Scholarship,* founded by the employees of the Block Drug Company in memory of Alexander Block, Class of 1907, is awarded annually to a student following completion of the first year in the College of Pharmaceutical Sciences. The value of the award is about $100, the annual income of the fund, to be applied toward the tuition of the second year.

The *Henry Pfeiffer Scholarships,* established as a memorial to Henry Pfeiffer by the trustees of his estate, provide scholarships of $200 each for three worthy second-year students. The scholarships are awarded on the basis of financial need, scholarly ability, and the personal qualifications of the applicant for the practice of pharmacy. They are ordinarily awarded to students for one year only, although students of promise may receive scholarship aid in subsequent years if funds are available. If the scholar fails to maintain an average of B in his studies, or if for any other reason his continued holding of a scholarship is found to be undesirable, the appointment may be terminated at the end of a term.

THIRD YEAR

The *Max Blank Memorial Scholarship,* established by his family in memory of Max Blank, Class of 1937, is awarded annually to a worthy student who has successfully completed in this College the course work of the second year. The value of this scholarship is $300, to be applied toward the tuition of the third year.

THIRD, FOURTH, OR FIFTH YEARS

The *American Foundation for Pharmaceutical Education Scholarships,* three scholarships of $200 each, are awarded to three students, entering the fourth or fifth year, in need of such support.

The *John W. Dargavel Scholarship* of $200, sponsored by the John W. Dargavel Foundation of the National Association of Retail Druggists, is awarded annually to a student entering the third, fourth, or fifth year.

FOURTH YEAR

The *Joseph Genovese, Sr., Scholarships,* established by Genovese Drug Store, Inc., are awarded annually to assist students whose primary interest is in community pharmacy, and who are in the fourth or fifth year of the program in pharmaceutical sciences. Ordinarily, three scholarships in the amount of $300 each are awarded.

FIFTH YEAR

The *J. Leon Lascoff Memorial Scholarship,* founded by Dr. Frederick D. Lascoff in memory of his father, J. Leon Lascoff, Trustee, 1916–1940, and a vice president of the College, 1940–1943, is awarded annually to a student entering the fifth year, on the basis of excellence in previous courses in pharmacy laboratory. This award of $200 is to be applied toward tuition of the fifth year.

The *Past Presidents' Award* of $100, offered by the Women's Auxiliary of the Pharmaceutical Society of the State of New York and applicable to the tuition of the fifth year, is awarded to the student whose academic record at the end of the fourth year shows the greatest improvement over that of the first year.

PRIZES

FIRST YEAR

The *Women's Club of the Columbia University College of Pharmaceutical Sciences Award* consists of two prizes of $150 each, awarded to students, one man and one woman, who have demonstrated outstanding scholarship in all courses of the first year, especially in the humanities.

FIRST AND SECOND YEARS

The *Rho Chi Awards,* sponsored by Beta Gamma Chapter of Rho Chi Society, the national pharmaceutical honor society, consist of six reference books, one awarded to each of the three highest ranking first-year students and to the three highest ranking second-year students, in recognition of superior scholastic achievement as indicated by the quality point average at the end of the respective academic years.

The *E. R. Squibb Prize* of $100, offered by E. R. Squibb and Sons in memory of Dr. E. R. Squibb, former lecturer in the College, is awarded annually to the student who exhibits the greatest proficiency in chemistry courses of the first two years.

THIRD YEAR

The *Alpha Zeta Omega Award,* a set of reference books, is given annually by the Zeta Chapter of Alpha Zeta Omega to the fourth-year student who has achieved the greatest proficiency in the science courses of the third year.

The *August A. DiSomma Award,* established by the Student Council in memory of Dr. August A. DiSomma, for many years a devoted professor of chemistry, is a U.S. Savings Bond presented annually to the student who has shown the highest proficiency in the chemistry courses of the first three years.

FOURTH YEAR

The *Samuel Abate Award,* a bronze plaque established by the Class of 1958 in memory of their beloved classmate Samuel Abate, whose death occurred during the senior year, is awarded to the student entering the fifth year who, in the opinion of the fifth-year class, has made the greatest contribution to its welfare.

The *Apothekan Award* of $50, conceived by the Apothekan Staff of 1960 and supported by succeeding staffs, is given annually to the student completing his fourth year whose interest in student publications has contributed most to the welfare of his class.

The *George J. Seabury Award,* founded by Dr. Henry C. Lovis in memory of his uncle, George J. Seabury, for many years a member and patron of the College, is awarded annually to the student entering the fifth year who has maintained the highest standing during the preceding four years. The value of the award is about $200, the annual income of the fund, and is to be applied toward the tuition costs of the fifth year.

FIFTH YEAR

The *Alumni Association Prizes,* provided by the Alumni Fund of the College of Pharmaceutical Sciences, consist of a gold, a silver, and a bronze medal to be presented at Commencement to the three members of the graduating class who have placed respectively first, second, and third in all required subjects taught during the fifth year.

The *Edgar S. Bellis Memorial Award,* provided by the Westchester County Pharmaceutical Society, is awarded annually to the senior student who has made the most distinguished record in courses related to the practice and management of community pharmacy. The award, consisting of a medal, is presented in the memory of Edgar S. Bellis, a former Trustee and Treasurer of the College.

The *Max J. Breitenbach Prize* of $100 is offered annually by the Trustees of the College of Pharmaceutical Sciences, in memory of Max J. Breitenbach, for many years a devoted trustee, and is awarded for the highest proficiency in the fifth year.

The *Bristol Award,* a copy of a reference book, is offered annually by Bristol Laboratories, Incorporated, to a fifth-year student who has made a substantial contribution in advancing the interests of his class.

The *Dean's Award,* provided by Johnson and Johnson, is awarded annually to the student who performs outstandingly in the area of administrative pharmacy. The award consists of a hand-turned replica of a Revolutionary War mortar and pestle. The recipient is eligible to compete for a $1,000 scholarship for graduate study in administrative pharmacy or business management.

The *Louis Dohme Prize* of $50, founded by Ernest Stauffen in memory of Louis Dohme, is awarded annually to the student who exhibits the best practical knowledge of the drugs of natural origin of the United States Pharmacopeia and National Formulary, as determined by the laboratory records and examinations in pharmacognosy.

The *Diekman Prize,* founded in 1930 by the Dante Circle in honor of the late Dr. George C. Diekman, consists of a gold charm and is awarded to that student who has maintained the highest average in courses in the pharmacy and chemistry of medicinals.

The *Kappa Psi Award,* a gold medal, is given annually by the Gamma Chapter of Kappa Psi to the candidate for the degree of Bachelor of Science in pharmacy who maintains the highest standing throughout the course.

The *Leiterman Award,* a gold medal offered annually by Miss Lillian Leiterman, Class of 1911, is awarded to the woman graduate who has maintained the highest standing throughout the course.

The *Lilly Achievement Award,* a gold medal, is awarded to the graduate who has demonstrated superior scholastic and professional achievement leadership qualities, as well as professional attitude. These qualities, along with academic performance, will be considered in the selection of the individual for this award.

The *McKesson & Robbins Award,* a plaque and gavel trophy, is presented annually by McKesson & Robbins, Incorporated, to the student who has served as president of the student chapter of the American Pharmaceutical Association.

The *Merck Awards,* consisting of the Merck Index or the Merck Manual, are given to the graduate who attains the highest average in pharmacology and to the graduate who attains the highest average in dispensing pharmacy.

The *Olshansky Memorial Award,* a gold medal, founded by the students in attendance in 1923–1924, in memory of their beloved instructor, Jacob Calman Olshansky, whose death occurred in that academic year, is awarded annually to the graduate who has attained the highest average in pharmacy courses of the required course in the fifth year.

The Pharmaceutical Society of the State of New York offers a five-year membership to the graduate who, in the opinion of the class, has been foremost in promoting student welfare.

The Class of 1922 *Samuel B. Reiman Award,* consisting of the latest edition of the United States Dispensatory, suitably embossed on the cover, is presented to the president of the graduating class in memory of Samuel B. Reiman, president of the Class of 1922, who died in January 1947.

The *Rexall Award,* consisting of a bronze mortar and pestle trophy, is awarded to the graduate who has attained distinction in cocurricular activities as a student in the College.

▶ GRADUATE AWARDS

GRADUATE SCHOLARSHIPS

Graduate Tuition Scholarships are available in limited numbers. The scholarships exempt students from tuition for courses taken at the College of Pharmaceutical Sciences.

GRADUATE FELLOWSHIPS

Applications for the graduate fellowships must be made before April 1 on forms issued by the Office of the Dean.

The *American Foundation for Pharmaceutical Education Fellowships* for graduate study are awarded annually by the Foundation. The grants cover tuition, fees, and books, and include an amount for living expenses. Further information is available from the American Foundation for Pharmaceutical Education, 777 Fourteenth Street, N.W., Washington, D.C. 20005.

The *Herman J. Amsterdam Memorial Award,* founded in 1971 by friends and colleagues of Herman J. Amsterdam, is given annually to a graduate student who demonstrates the greatest potential contribution to the field of cosmetic science. The value of the award is about $300, the annual income of the fund, to be applied to the expenses of graduate work.

The *Bigelow Fellowship* for research in pharmacy, established through the bequest of Clarence O. Bigelow, treasurer of the College from 1897 to 1937, is awarded annually to a student who holds the bachelor's degree from the Columbia University College of Pharmaceutical Sciences or from another accredited college of pharmacy. The recipient will undertake graduate studies in the College of Pharmaceutical Sciences and will participate in the teaching program. The value of the fellowship is $1,600. Tuition will be remitted during the period covered by the fellowship.

The *International Flavors and Fragrances Graduate Teaching Fellowship,* providing a stipend of $2,500 and remission of tuition, is awarded annually to a superior graduate student whose interests are in chemistry or the scientific aspects of cosmetics.

The *Isaac Plaut Fellowships* for the encouragement of graduate study and original research, founded by Albert Plaut in memory of his father, Isaac Plaut, are awarded annually to candidates for the Columbia University degree of Bachelor of Science in pharmaceutical sciences who have shown scholarly ability and an aptitude for original investigation. The choice of the program and the institution for graduate study are subject to approval by the Faculty of Pharmaceutical Sciences.

The *Harry Taub Memorial Fellowship,* established by Mr. and Mrs. Richard Taub in memory of their son, Professor Harry Taub, for many years a member of the faculty of this College in the Department of Pharmacology, is awarded annually to a member of the senior class who is qualified to pursue graduate work at the College of Pharmaceutical Sciences. The value of the fellowship is about $400, the annual income of the fund, to be applied toward the expenses of the graduate study.

RESEARCH FELLOWSHIPS

Research fellowships with stipends varying from $2,500 to $5,000 also provide tuition remission and are available for the support of graduate student research. As a rule the fellowships are awarded only to students who have completed one year in residence.

GRADUATE ASSISTANTSHIPS

Assistantships provide a stipend of $2,750 and remission of tuition. They are available to graduate students with superior qualifications. Assigned duties may have to do with specific courses or with research. Research assistantships and appointments above the minimum rate are not generally available to first-year graduate students. Continuation of financial aid is dependent upon satisfactory academic performance and progress toward the respective degrees.

Application should be made at the time of application for admission to graduate study and annually thereafter.

RESIDENCIES FOR PHARM.D. DEGREE CANDIDATES

A limited number of residencies are available to degree candidates in the Pharm.D. program. Candidates will be chosen on the basis of a personal interview and availability of funds at an affiliated hospital. For further information contact the Director of Admissions, College of Pharmaceutical Sciences, 115 West 68th Street, New York, N.Y. 10023.

Regulations

THE DEAN

The Dean is the chief executive officer of the Faculty. It is his duty, under the direction of the President, to enforce the rules of the Faculty and of the Board of Trustees and to administer discipline in the case of their violation.

STUDENTS

Each person whose registration has been completed will be considered a student of the University during the term for which he is registered unless his connection with the University is officially severed by withdrawal or otherwise. No student registered in any school or college of the University shall at the same time be registered in any other school or college, either of Columbia University or of any other institution, without the specific authorization of the dean or director of the school or college of the University in which he is first registered.

The privileges of the University are not available to any student until he has completed his registration. Since, under the University statutes, payment of fees is a part of registration, no student's registration is complete until his fees have been paid. No student is permitted to attend any University course for which he is not officially registered unless he has been granted auditing privileges. No student may register after the stated period unless he obtains the written consent of the Dean.

ACADEMIC DISCIPLINE

The continuance of each student upon the rolls of the College, the receipt by him of academic credits, his graduation, and the conferring of any degree or the granting of any certificate are strictly subject to the disciplinary powers of the College, which is free to cancel his registration at any time on any grounds which it deems advisable. The disciplinary authority of the College is vested in the Dean in such cases as he deems proper.

ATTENDANCE

Students are particularly requested to be in attendance at the beginning of the term in order to obtain full benefit from the course. No student will be admitted later than two weeks after the opening of the term.

Attendance is required of all students. Situations may occur in which it will be impossible for a student to attend class, and the regulations which follow take such circumstances into account. These regulations set forth the absolute maximum of acceptable absences. Students are advised to keep well below these maximums;

those who exceed the permitted number of absences in a course will receive the grade of F for the course.

1. For the didactic (lecture and conference hours) portion of *all* courses:

(a) A student who, in the judgment of the instructor in charge, has achieved the grade of C or lower by the last session of the course before the final examination period, may not exceed *three* times the number of class (clock) hours (lectures and conferences) scheduled weekly for the courses.

(b) A student who, in the judgment of the instructor in charge, has achieved the grade of B or above by the last session of a course may not exceed *four* times the number of class (clock) hours (lecture and conference) scheduled weekly for the course.

2. For the laboratory portion of a course, a student may not be absent from more than one laboratory period. A student who has more than one absence from a laboratory period must make appropriate arrangements with the instructor in charge of the course to complete the missing assigned work or the equivalent. If no such arrangements are feasible, the student automatically receives the grade of F for the entire course.

Absences for religious observances are counted in the number of allowable absences.

Each student is responsible for keeping a record of the date of each absence or lateness and the reason for it. A student who has had a communicable disease must present to the Director of Student Affairs a note of approval for readmission to classes signed by the student's physician.

WITHDRAWAL

An honorable discharge will be granted to any student in good standing and not subject to discipline who may desire to withdraw from the University. No student under the age of twenty-one years shall be entitled to a discharge without the assent of his parent or guardian furnished in writing to the Director of Student Affairs. Students withdrawing are required to notify the Director of Student Affairs in writing immediately.

The Dean may, for a valid reason, grant a leave of absence to a student in good academic standing.

EXAMINATIONS, GRADES, AND CREDITS

All courses usually close with the written examinations held in January and May (see the Academic Calendar on pages 2–3). Apart from these examinations, the instructors having charge of the respective courses hold tests to determine proficiency.

The student's performance in a course is reported according to the following grades: A, excellent; B, good; C, fair; D, poor—minimum pass; F, failure.

The grade of F is recorded for every course in which a student is absent from the final examination unless specific authorization to apply for a special examination is obtained by the student from the Dean's office not later than the day of the examination.

When a grade of incomplete is reported in any course, the student must arrange to complete the work before the close of the following term to receive credit.

Re-examinations are held during the periods established by the faculty. They are open, upon application filed with the Chairman of the Instruction Committee, for students who have been absent for imperative reasons from a final examination. Only one re-examination is allowed in a given course. If a student fails to take the stated re-examination following the completion of the course in which he is deficient, no further opportunity is afforded, and a grade of F is recorded.

Each credit of course work carried during a term is awarded a quality point value in accordance with the following scale: each credit of a grade of A is multiplied by 4; B by 3; C by 2; D by 1; F by 0. The sum of the quality points thus obtained, divided by the total number of credits carried, is the quality point average (Pharmaceutical Sciences) or the merit rating index (Health Sciences).

On the basis of the quality point average or merit rating index, the faculty recommends advancement, probationary status, or academic dismissal. Consult the student handbook for the averages established as guidelines for such actions.

The quality point average is used to establish eligibility for graduation, graduation with honors, and membership in Rho Chi for students in the Pharmaceutical Sciences. The merit rating index is used to establish such eligibility for students in Health Sciences, and for Dean's List for all students.

CREDIT FOR COURSES TAKEN OUTSIDE THE COLLEGE

Students who are duly registered in the College as degree candidates may not receive degree credit for courses completed at other institutions, including the several divisions of Columbia University, unless written approval for such courses is received in *advance of registration* from an appropriate officer of the College authorized by the Dean to grant such approval. Graduate students are directed to consult with the Chairman of the Committee on Graduate Education or Committee on Graduate Professional Education before registration.

DIPLOMAS

Diplomas are issued in June at Commencement, in October, and in February and are granted only upon action of the Faculty.

1972

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30						

Index

Absences, 61–62
Academic Calendar, 2–3
Accreditation of the College of Pharmaceutical Sciences: *see* inside front cover
Administrative pharmacy, graduate program in, 35–36, *see also* Community health and administration
Admission: to the Bachelor of Science programs, 11–15; to the Master of Science programs, 31–33; to the Doctor of Pharmacy program, 36–37; to the Doctor of Philosophy program, 37–38; to evening courses, 45
Advanced placement, 13–14
Advanced standing: in undergraduate programs, 14; in graduate programs, 35, 37
Advisers, academic, 50
American Chemical Society Student Chapter, 50
American Pharmaceutical Association: 5; Student Chapter, 50
Application: for admission, 13; for a degree, 3, 47, 48; for graduate fellowships, 59; for graduate assistantships, 60
Applied science and industrial administration courses, 19
Applied pharmaceutical sciences, evening program in, 45
Assistantships (graduate): research, 33, 60; teaching, 33, 60; *see also* Financial aid
Attendance, 61–62
Awards: acceptance from another institution, 33; date for resigning from appointments, 33; *see also* Financial aid

Baccalaureate Service, 3
Bachelor of Science programs: 11–30; admission to, 13–15; degree requirements, 15; curriculum, 15–17; courses, 18–30
Biological sciences and pharmacology courses, 21–22; *see also* Pharmaceutical biology courses
Books and supplies, cost of, 48

Calendar: academic, 2–3; monthly, 64
Candidacy for the M.S. degree: length of, 34; termination of, 34
Candidacy for the Pharm.D. degree, termination of, 37
Certificate in applied pharmaceutical sciences program, 45
Chairmen of departments, 9
Chemistry courses, 22–23; *see also* Pharmaceutical chemistry courses
College Entrance Examination Board, 13
Columbia University: affiliation with the College of Pharmaceutical Sciences, 5
Commencement, 3, 63
Community health and administration: undergraduate courses in, 25–27; graduate courses in, 39–40; *see also* Administrative pharmacy, graduate program in
Composite fee, 47, 48
Counseling, 50–51
Courses of instruction: points of credit, 13–14, 15, 18–19, 62–63; numbering system, 18–19; for the undergraduate programs, graduate, 18–30; 39–44
Credits: point value of, 63; for courses taken outside the College, 63
Credits (graduate): for advanced standing, 35, 37; for the degrees in pharmaceutical sciences and administrative pharmacy, 36; for the Pharm.D. degree, 37; for the Ph.D. degree, 37–39
Credits (undergraduate): required for admission, 11–13; for advanced placement, 13–14; for advanced standing, 14; required for the B.S. degree, 15; for individual courses, 18–19; for the certificate in applied pharmaceutical sciences, 45
Curriculum: undergraduate, 15–30, 45; graduate, 34–44

Dean's List, 53
Degree requirements: Bachelor of Science programs, 15; Master of Science programs, 36; Doctor of Pharmacy program, 37; Doctor of Philosophy program, 37–39

Degrees: dates of award, 3; dates for filing application for 3; *see also* Bachelor of Science programs, Doctor of Pharmacy program, Doctor of Philosophy program, Master of Science programs
Diplomas, 63
Discipline, academic, 61
Doctor of Pharmacy program, 36–37
Doctor of Philosophy program, 37–39
Dormitories: *see* Housing

Elective courses: before admission, 13; given in the evening, 19, 45; for the undergraduate programs, 30
Employment, student, 48
Essays, filing of, 3
Evening program, 45
Examinations, 62–63; dates of, 3; state licensing, 11; English Language Placement Test for foreign students, 33; graduate placement, 33; *see also* Doctor of Pharmacy program, Doctor of Philosophy program, Master of Science programs
Expenses: books and supplies, 48; *see also* Fees

Faculty of Pharmaceutical Sciences, 7–8
Fees: commitment, 13; payment of, 15, 61; matriculation maintenance, 34; schedule of, 47–48; for undergraduates, 47; for graduates, 48; adjustment of, 48
Fellowships: graduate, 59–60; research, 60; *see also* Financial aid
Financial aid: for graduate students, 33, 59–60; for undergraduate students, 54–58; *see also* Employment, student; Loan funds
Foreign students, 51; admission of undergraduate, 14–15; admission of graduate, 31, 33; orientation program for, 51
Fraternities, 50

General education courses, 27–29
Grades, 15, 62–63
Graduate assistantships, 33, 60; *see also* Financial aid
Graduate fellowships, 33, 59–60; *see also* Financial aid
Graduate scholarships, 33, 59; *see also* Financial aid
Graduate study: 31–44; program in pharmaceutical sciences, 35, 36; program in administrative pharmacy, 35–36; *see also* Doctor of Pharmacy program, Doctor of Philosophy program, Master of Science programs
Graduation, 3, 63

Health insurance for graduate students, 34, 48
Health sciences, program in: 11; admission to, 11–15, curriculum, 17
History of College, 5
Honors and Awards, 53–60
Honors Program, 53
Housing, 49

International Pharmaceutical Students Federation, 50

Leaves of absence: 62; for graduate students, 34, 62
Libraries, 51
Licensing examinations, state, 11
Loan funds, 49

Master of Science programs: 31–36; dates for filing essays, 3; admission to, 31–33
Mathematics courses, 23–25
Matriculation maintenance fee, 34
Medical examination form, 13

Officers of administration and instruction, 6–10
Organizations, student, 50

Pharmaceutical biology courses, 40–41
Pharmaceutical chemistry courses, 41–42
Pharmaceutical sciences: undergraduate program in, 11; admission to, 11–15; curriculum, 15–16; graduate program in, 35, 36; courses, 42
Pharmaceutical Sciences, College of: history and program, 5; officers and trustees, 6; faculty, 7–10
Pharmaceutics courses: undergraduate, 29–30; graduate, 42–44
Physics course, 25
Placement, advanced, 13–14
Placement examinations (graduate): for foreign students, 33; for all M.S. candidates, 2, 33
Points of course credit, 13–14, 15, 18–19, 62–63
Prizes (undergraduate), 56–58

Programs of study: *see* Bachelor of Science programs, Certificate in applied pharmaceutical sciences program, Doctor of Pharmacy program, Doctor of Philosophy program, Master of Science programs

Quality point system, 63

Refund of fees, 48
Registration: dates for, 2, 3; for the undergraduate and graduate programs, 47
Regulations, general, 61–63
Religious counseling, 51
Required courses: undergraduate, 15; graduate, 34–35
Research: assistantships, 33, 60; fellowships, 33, 60; *see also* Financial aid
Residence halls: *see* Housing
Residence requirements: for programs in pharmaceutical sciences and administrative pharmacy, 36; for Doctor of Pharmacy program, 37
Residencies, 33, 60
Rho Chi Society, 53

Scholarships: undergraduate, 54–56; graduate, 33, 59; *see also* Financial aid
Scholarship Aptitude Test, 13
Social security numbers, 47
Sororities, 50
State licensing examinations, 11
Student Council, 50
Student organizations, 50
Supplies, cost of, 48

Teaching assistantships, 33, 60; *see also* Financial aid
Termination of candidacy, 34, 37
Trustees of the College, 6
Tuition: *see* Fees

Undergraduate programs, 11–30; *see also* Applied pharmaceutical sciences, evening program in

Withdrawal, 48, 61, 62

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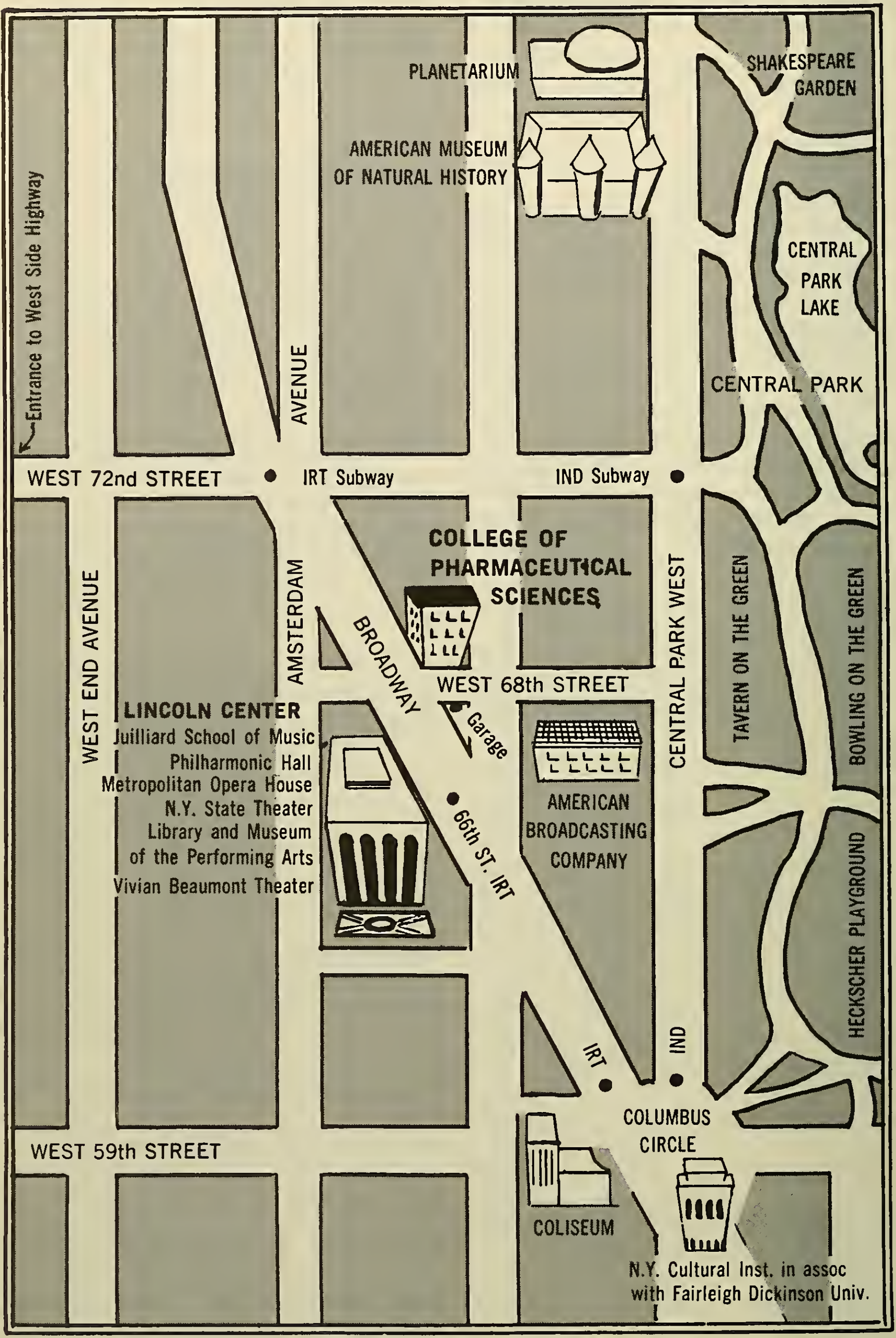

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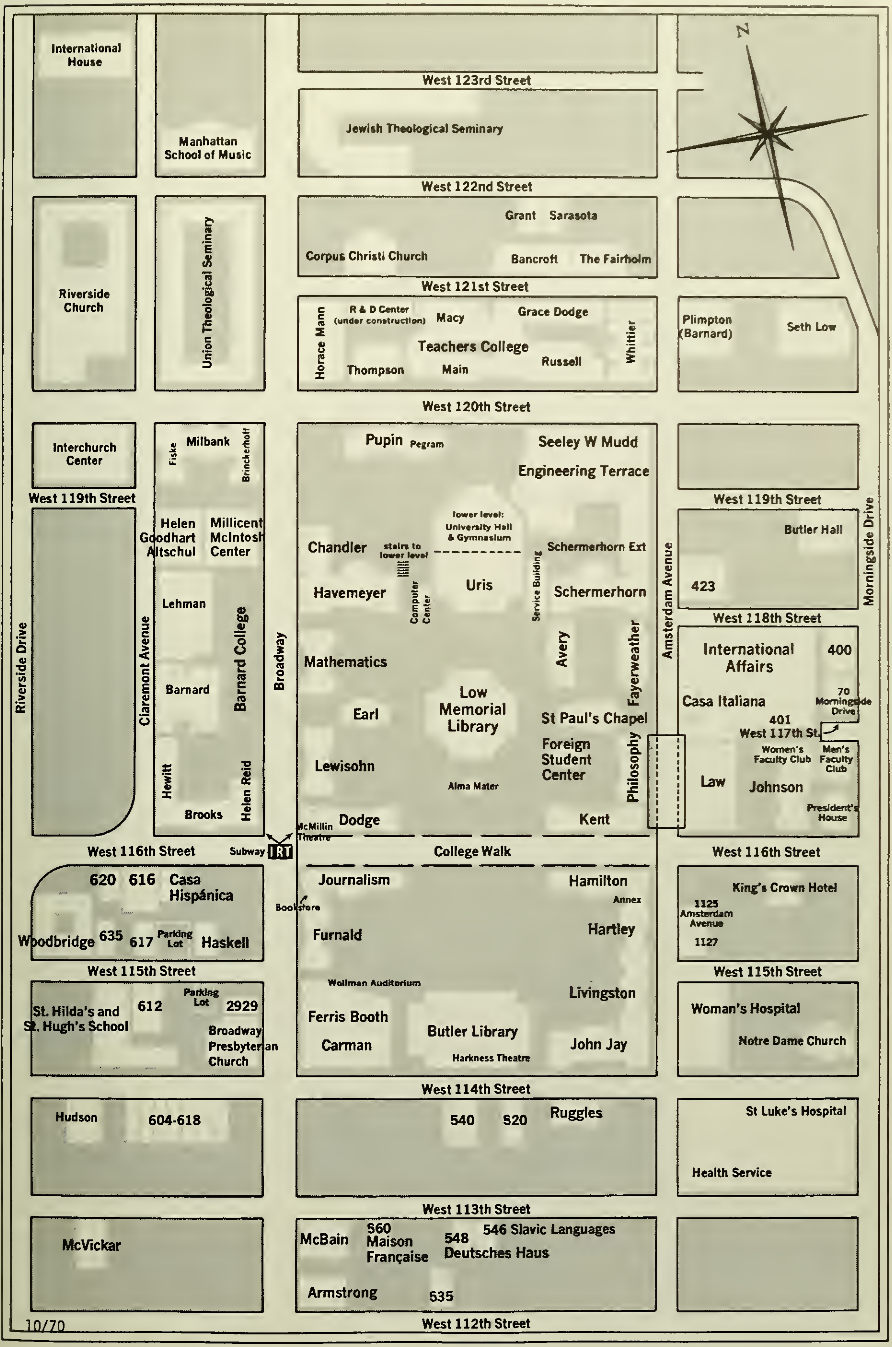

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